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ADVANCED TACTICAL ELECTRONIC WARFARE ENVIRONMENT SIMULATOR (ATEWES)

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AMHERST SYSTEMS INC.

ADVANCED

TACTICAL ELECTRONIC WARFARE

ENVIRONMENT SIMULATOR

(ATEWES)

OPERATOR'S MANUAL

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INTRODUCTION

The Advanced Tactical Electronic Warfare Environment Simulator (ATEWES) Control Subsystem Software is designed to run under Digital Equipment Corporation'S RSX-11M operating system. It is written using both the Fortran IV and Assembly languages supplied by Digital Equipment. The TEWES Control Subsystem Software supports all necessary data transfer from the scenario file to the Digital Generator Support programs are also provided for scenario and library file maintenance and listing.

All ATEWES operator interaction begins with the ATEWES Executive Menu. This menu allows the operator to select the desired ATEWES function and parses control to the appropriate program. System level commands are also included to support file maintenance and backup operations. A System Maintenance submenu allows the operator to access fault testing functions.

The general operating sequence begins with the Library Maintenance Program which is used to generate and maintain an emitter parameter database. The Scenario Development Program is then used to generate or edit a scenario file prior to a test run. The Scenario Listing program may be used to obtain a printed copy of the test scenario. When the scenario file is fully prepared, the system under test files (Receiver Sensitivity, Antenna Pattern and Gain) are generated or updated using the system text editor. When all data files are ready, the Realtime Simulator Program initiates and controls the real time simulation.

SECTION 1

GENERAL PROCEDURES

1.0 INITIATING A PROGRAM

All ATEWES programs are initiated under control of the ATEWES Executive Menu. The operator selects the desired function and control is passed to the appropriate program.

1.1 DATA ENTRY

Whenever information is required by a program, the operator is prompted with a description of the data to be entered, and the program then waits for the data to be entered on the operator's terminal. When entering alphanumeric data, leading and trailing spaces should be avoided, as they are interpreted as zeroes. The program is also equipped with backup and cancel features, which allow for simple correction of data entry errors. When data is requested, terminating the line with an ! will cancel the command currently being processed. Terminating the line with an ← causes the program to back up one question and repeat the previous input request. Note that in the case of commands requiring a single input, both responses have the same effect. In most cases, entering a single space before depressing the return key is translated to a zero input, except for some special cases, notably when editing a particular event. Input prompts also contain the applicable units associated with the response. The program includes legal limits for every numeric request, and responses outside these limits produce an error message and the request is repeated.

A help feature may also be invoked by entering a ? in response to any pending prompt. The program reads the help text file and displays additional information concerning the current prompt. The help information includes up to seven lines of general operational information, up to seven lines of information concerning the current ATEWES program, and up to seven lines of text concerning the current prompt. If no help text file is found, an error message is output. After help processing is complete, the current prompt is reissued.

1.2 FILE CONVENTIONS

Default conditions exist when entering file names to be used for Scenario and DX files. All Scenario Files are assumed to reside on logical device SC:, and use a default extension of .SCN. Similarly, all DX files are created on logical device DO:, and are given a default extension of .DX.

The file name consists of any nine alphanumeric characters. The file extension is used to specify the file type. All simulator system files are designated as follows.

.FTN	Fortran source files
.MAC	Assembler source files
.OBS	Object files
.OLB	Object library files
.CMD	Procedure files

The following convention is recommended for simulator data files.

.SCN	Scenario files
.DX	Data Extraction files
.DAT	Topageaphy Files
.LIB	Emitter Library Files

SECTION 2

EXECUTIVE MENU

The Executive Menu provides access to all programs available on the ATEWES Control Computer. A program is selected by entering the appropriate code for the desired program. If the Executive Menu has been exited and the operator has an MCR prompt (>), the Executive Menu may be restarted by typing in the command RUN TMENU.

2.1 Code 1 - Emitter Library Maintenance.

Selecting code 1 starts the Emitter Library Maintenance program. The Emitter Library Maintenance program allows the operator to create and edit an emitter parameter database. The database may be created entirely from operator inputs, or may be translated from an EWIR tape.

2.2 Code 2 - Scenario Development.

Selecting this code runs the Scenario Editor program. The Scenario Development is used to build and edit scenario files. The program also may create and edit topographical data for use as a background for the graphics display.

2.3 Code 3 - Scenario Listing.

Selecting code 3 runs the List Scenario program. The scenario Listing program generates formatted displays of a selected scenario file. The display may be directed either to the operator's console or the the printer.

2.4 Code 4 - Pulse Density Analysis.

Selecting code 4 runs the Pulse Density Analysis program. This program is used to analyze the pulse density of a scenario file as measured by pulse count data recorded in a DX file.

2.5 Code 5 - Preprocessing for Correlation.

Selecting code 5 initiates the Preprocessing for Correlation program. The Preprocessor program performs redundancy checking and data reduction on raw EW data files.

2.6 Code 6 - Correlation.

Selecting code 6 initiates the Correlation program. This program compares a Dx file and an EW event file and correlates detected and simulated emitters.

2.7 Code 7 - Correlation Analysis.

Selecting code 7 initiates the Correlation Analysis program. The correlation Analysis program produces statistical data using the correlated results of a simulation exercise.

2.8 Code 8 - Simulation Recording Listing.

Selecting code 8 initiates the Mixed Listing program. This program outputs formatted displays of ATEWES DX files, preprocessed EW files and correlated emitter files. The output may be directed either to the operator's console or to the printer.

2.9 Code 9 - File Interchange.

Selecting code 9 initiates the File Interchange program. This program is used to transfer files between the TEWES Control Computer and a VAX. Transfers are made through a serial link or magtape.

2.10 Code 10 - Realtime Simulation.

Selecting code 10 initiates the Realtime Program. The realtime program executes a scenario file and controls allsimulated environment generation and monitoring.

2.11 Code 11 - System Maintenance.

When code 11 is selected a submenu of System Maintenance programs is displayed. To run a System Maintenance program enter the appropriate selection code.

2.11.1 Subcode 1 - Manual DGU Programming.

To run the Manual DGU Programming program enter code 3 from the System Maintenance submenu. This program allows the operator to send single commands from the Control Computer to the Digital Generator.

2.11.2 Subcode 2 - Raw Emitter Data Dump.

To run the Raw Emitter Data Dump Program enter code 2 from the System Maintenance submenu. This program outputd a formatted dump of selected Digital Generator parameter memory.

2.11.3 Subcode 3 - Fault Testing.

To run the Fault Testing program enter code 3 from the System Maintenance submenu. The Fault Testing program is used to verify proper operation of the Digital Generator and the RF Subsystem.

2.12 Code 12 - System Utilities.

When selection 12 is made a submenu of System Utility functions is displayed. The System Utility functions are used for backing up the discs, manipulating files, initializing new DX discs, and restoring data from backups.

2.13 Code 88 - Help.

Selecting code 88 from the main menu redisplays the menu.

2.14 Code 99 - Exit.

Selecting code 99 causes the Control Menu program to exit. The operator is

returned to the MCR prompt of RSX-11M. To restart the Control Menu Program type in RUN TMENU.

SECTION 3

LIBRARY MAINTENANCE PROGRAM - EDLIB

The library maintenance program creates new and maintains existing ATEWES Library disk files. Library file creation and maintenance is implemented via operator interaction and/or through use of a magnetic tape copy of the U.S. Air Force EWIR data base. The Library File format is described in the Library Maintenance Software Design Description. Program EDLIB is executable under the Digital Equipment Corporation 's RSX-11M operating system; all library maintenance software is written in the Fortran-IV and Assembly languages utilized with RSX-11M.

3.1 GENERAL OPERATION

The library maintenance program is used to create and maintain library emitters that may be recalled to a scenario file during scenario maintenance operations (Section 4). A new library file is generally created from an EWIR data base tape; optionally, the operator can manually create a library file through use of the Edit Library Emitter(s) command. In general, the program requires as input either a binary ATEWES library file or an ASCII EWIR data base tape, or both.

The library maintenance program outputs a new or updated library disk file. Each time the operator accesses the library file via program EDLIB, the input library file may be extended or reduced in size. The output library file is a modified version of the input file. The library maintenance program does not create a file of higher version number each time a library edit procedure is initiated. Program EDLIB edits an existing library file and outputs additional data to, or deletes data from, the file as required. The version number of an edited file remains unchanged from the original version number assigned during file creation.

Library emitters are stored in a random order. Disk records within the file are reused whenever possible. If the operator deletes an emitter from the library file, the records used by that emitter remain part of the file as assigned by

the RSX-11M operating system; however, those records are released for reuse internally by the program. A bit map contained in the file header is used to allocate and reallocate available blocks in the file. File size is always determined by the highest record number ever written to the file, even though that record might no longer contain active library data.

Each library emitter is characterized by a six alphanumeric character ELINT label. For emitter modes created by the operator, the characters may be any alphanumeric combination with the restriction that the last character is A-Z. ELINT labels for those modes created via EWIR data base tape information are formatted from the standard 5 character ELNOT notation used in the EWIR data base; the sixth character is a digit assigned by the program during file creation using the EWIR data base tape as input. Library emitter information is stored in the library disk file randomly. The information is indexed by a record array contained in the file header which is sorted in label aplphabetical order.

The operator may use program EDLIB to update an existing library file with data from a new EWIR data base tape. Only those emitters with a numerical sixth character shall be accessed for update in the library. Those emitter modes appended by an alphabetical sixth character remain unchanged during the EWIR update process. If program EDLIB is unable to correctly decipher input EWIR data during emitter update command processing, the characteristics of that emitter in the library remain unchanged.

The operator uses the List EWIR Elint System(s) command to list EWIR tape data on an ELINT system basis. The operator may use this information to correct any emitter modes incompletely formatted by the library file creation/update processes.

Upon initial execution of program EDLIB, the operator is prompted to enter a library file name. The program attempts to access the file on logical device CR:. The default file extension used by the program is .LIB. If the program finds the file specified by the operator, the file is opened and the operator manipulates file information by use of the commands described in Section 3.2.2. If the program is unable to open the file specified, it is assumed that a new

library file is to be created and the program opens a new disk file and begins to create library emitter modes from the information contained on the EWIR data base tape. Depending on the complexity of the information contained on the tape and the load on the operating system during file creation operations, file creation is expected to take anywhere from 2-10 hours.

The U.S. Air Force EWIR data base contains ELINT parameter data for emitters capable of operating in one or more functional modes (e.g., track, acquisition, scan, track-while-scan, etc). Program EDLIB creates a 256 word, 3 block library file emitter mode entry for each EWIR ELINT system operational mode, up to a maximum of 10 modes per ELNOT notation contained in the data base. The 3 blocks required for each emitter mode are contiguous; however, subsequent emitter mode entries in the file for the same 5 character ELINT notation are not necessarily contiguous once the library data has been manipulated by the operator.

3.2 OPERATING INSTRUCTIONS

Use of the Library Maintenance program with U.S. Air Force EWIR extracted data must be performed in a facility which can handle SECRET/NOFORN information. Any hardcopy generated from the classified data contained in a library file must be treated as SECRET/NOFORN material.

The library maintenance program is initiated by selecting Library Maintenance from the ATEWES EXECUTIVE MENU or by entering RUN EDLIB on the operator's console. When the program begins execution, it requests the name of the existing library file to be used for input. If a file name is entered and not found, the program initiates the library file creation process described in Section 0t3.2.1. If the input file is successfully opened, the program displays the library file header information and then prompts the operator to enter one of the nine commands described in Section 3.2.2.

At the end of a file creation session using an EWIR data base tape as input, program EDLIB displays the file header information for the newly created disk file and then enters the command processing mode. To exit from the program, the operator must enter command code 99. Upon exit, the program closes the library file, issues a tape rewind if required, and returns control to the operating

system.

The program requires an EWIR data base tape as input during the file creation process and for normal execution of the Update Library Emitter(s), List Library Emitter(s), and List EWIR Tape Directory command processing. If the operator does not have an EWIR data base tape on-line prior to initiation of these commands, the program outputs an error message to the operator's console and waits for the next command input by the operator. All other commands processed by the program are tape independent.

3.2.1 Library File Creation

Upon initial execution of program EDLIB, if the operator specifies a new library file name, the library file creation process is initiated. The operator must have an EWIR data base tape on line prior to initiation of the creation process.

The program prompts the operator to enter the upper and lower frequency limits which characterize the emitters in the file. Only those EWIR emitters whose transmitting frequency is within those limits shall be added to the new library file. The operator is prompted to enter a text comment which is stored in the file header. The tape is rewound to the beginning of tape and the file header parameters are output to the operator's console:

a. Library File Name
b. Date and time of file creation (updated each time the file is subsequently opened for file access).
c. Operator entered header text
d. Number of unique ELINT systems in library file
e. Minimum Frequency
f. Maximum Frequency

The format of the header parameter storage is described in the Library Maintenance Program Design Specification. After the header display, the operator is requested to enter the display lun (terminal or printer). This device is used for error message output during the file creation process.

The program outputs the file header blocks to the newly created file and then proceeds to format emitter modes from the ELINT information contained on the EWIR data base tape. Each operational mode for any Elint system is formatted into a unique 3 block library emitter mode. If an irrecoverable tape read error occurs during the file creation process, the program closes the disk file, rewinds the tape and exits. The information contained in the library file is incomplete in this case, but the operator may use the Update Library Emitter(s) command to update the existing library file with the additional information contained on the tape.

The program can format up to 10 emitter modes for each EWIR ELINT system found on the tape. If the system has more than 10 operational modes, the first 10 modes that the program can format are output to the library file; the rest of the operational modes are ignored for the emitter. An overflow message is output to the listing device; the operator must manually enter any additional emitter modes for this system.

If the file creation process is unable to completely decode an emitter operational mode, a one line error message is output to the listing device which gives the following information:

a. Six character emitter mode designator
b. Area of conflict:
    1. Frequency
    2. PRI
    3. Scan
c. Type of Error:
    1. Ambiguous mode code
    2. Incomplete information
    3. Duplicated information
    4. Decode error (e.g., information on tape has typographical error)
d. Parameter Data Record which caused error

The error messages output by the program during the file creation process should be considered SECRET/NOFORN information and treated accordingly.

In addition to the error messages generated during library file creation, the program shall output a one line success message to the listing device each time an emitter mode is successfully added to the library file.

Each emitter mode formatted from EWIR data shall contain three data sets with most likely, minimum, or maximum parameter values in each set. Since most EWIR data types are not characterized by a most likely value, the program uses an average value to replace most likely values which are not found in the EWIR data base. Some parameters, of course, do not have multiple values (e.g., scan return blank flag, frequency type, PRI type, scan type, etc). These 'fixed' parameters are identical for all three data sets. The parameter data selected for each library emitter mode is similar to that found in the ATEWES Scenario Development New Emitter Event. There are no System Control parameters in the library file.

3.2.2 Library Maintenance Commands

The library maintenance program has nine commands available to the user. Commands are given by entering a numeric code associated with the desired command. Command codes are assigned as follows:

LIBRARY MAINTENANCE COMMANDS

1	List Library Emitter(s)
2	Edit Library Emitter(s)
3	Delete Library Emitter(s)
4	Update Library Emitter(s)
5	List EWIR Elint System(s)
6	List EWIR Tape Directory
7	List Library Emitter Directory
98	Display Command Menu
99	Exit

Command code 0 (or carriage return) reoutputs the command menu. All command codes are valid during program operation once the operator has been requested to enter the command code. Individual commands are described below.

3.2.2.1 Code 1 - List Library Emitters

Command code 1 is used to output emitter mode information to the line printer. The operator selects the emitter modes to be listed in response to an ELINT request prompt. Emitter mode selection is entered in one of five ways.

MODE	RESPONSE	LIST OPTIONS
1	Single Character Input, A-Z	List data for all library emitters whose first label character is the same as the single character input.
2	Two characters separated by a delimiter; A-Z	List data for all library emitters whose first label character is the same as or between the two characters entered.
3	Five character input (ELINT ELNOT notation); ANNNA	List data for the library emitter modes characterized by the ELINT notation specified.
4	Six character input (ELINT notation plus alphabetical or numeric mode specifier)	List data for the single library emitter mode characterized by the ELINT notation and mode designator entered.
5	Null response, <CR>	List data for all emitters in the library file.

The command generates a line printer listing which displays the most likely (or average, where applicable), minimum, and maximum values for the emitter mode parameters stored in the library file. The list output displays data for each emitter mode in four consecutive sections:

a. Header Page
b. Frequency Page
c. PRI Page
d. Scan page

The data list descriptors are similar to those output by the ATEWES Scenario Development Program - EDSCN. There are no System Control parameters for a library emitter. Data characterized by most likely, minimum, and maximum values is listed in a three column format.

3.2.2.2 Code 2 - Edit Library Emitter(s)

Command code 2 is used to manually create new library emitter modes or update old library emitter modes. The list lun for this command is the operator's console. The operator is prompted to enter a six character emitter mode designator (mode 4, Section 3.2.1). He may enter a null reponse to the prompt; the program fetches the next emitter mode pointed to in the linked list of emitter modes. All emitter systems are sorted alphabetically via the first five characters of the mode notation. Multimode emitter systems are linked randomly together in order of creation. The operator may use the null response to access a particular emitter mode for edit, but that procedure is not recommended. In either case, only one emitter mode at a time may be accessed for edit.

If the EDLIB does not locate the six character emitter label in the library file, it starts emitter creation operations; the operator is requested to enter parameter values for the most likely data set. The program creates an emitter mode entry in the library file characterized by the specified emitter label and the most likely value set. The program then begins emitter edit operations in order to allow the operator to alter the minimum and maximum value sets. The operator may only create emitter modes appended with an alpha character mode designator; both alpha and numeric emitter modes may be edited.

If the operator alters any of the fixed parameters within any value set, the program will replace those parameters in the library file for all three data sets and issue a warning to the operator that it has done so. The operator is expected to then edit the parameter values in the other two data sets to match

the fixed variables previously edited. Fixed variables are those which specify frequency, PRI, and/or scan types and modes (Section 3.2.1) and are characterized by a single value output to all three library emitter data sets. The structure of the emitter edit/creation process allows the operator to easily create a library emitter characterized by a single set of parameter values.

If the six character emitter label is found in the library or if the operator enters a null response as an answer to the Elint prompt, or after the operator has created an emitter mode most likely value set, the task enters the emitter edit mode.

Initially during edit operations, the emitter parameters are output to the operator's console. The format of the library emitter display is identical to that output by the List Library Emitter(s) processing function (Section 3.2.1). The display is a multicolumn format which will generally scroll off the screen unless halted by the operator with a NO SCROLL or <CTRL/S> key.

Immediately following the multivalue display, the following command menu/prompt combination is output to the console screen:

EMITTER EDIT CONTROL

0 No Change
1 Most Likely Values
2 Minimum Values
3 Maximum Values

ENTER COMMAND (98 FOR MENU):

The operator selects the value set to edit and the program initiates emitter edit procedures similar to those described for the scenario development program. In the library emitter edit, the header display output is somewhat different in format and there is no header page or system page edit process. The operator chooses which of the four pages to display/edit in response to the following command/prompt combination:

EDITOR PAGE SELECT

1 -- Header Page
2 -- Frequency Page
3 -- PRI Page
4 -- Scan Page

ENTER PAGE SELECTION TO EDIT (RETURN TO EXIT):

Library maintenance does not allow a header page edit; if the operator selects page 1, the page 1 header parameters are displayed on the console screen and the page selection prompt is reoutput. All parameters displayed on the header page are automatically assigned by program EDLIB, and are identical for all three value sets except for the value set descriptor:

a. Edit date and time
b. Emitter ID (Six character ELINT mode notation)
c. Emitter Number (ELINT system number plus mode number in library)
d. Platform ID (six character platform ID)
e. Value set descriptor (Most likely, minimum, or maximum values)

The display/prompt sequence for frequency, PRI, and scan pages is identical to that of the scenario development program. The operator exits code 3 processing by a NULL, CANCEL, or BACKUP response to the editor page select and/or emitter edit control command menu/prompts.

3.2.2.3 Code 3 - Delete Library Emitter(s)

Command code 3 is used to delete emitter modes from the library file. The list device is the operator's console. The operator is prompted to respond to the ELINT specification prompt described in Section 3.2.1. The library emitter(s) or emitter range specified by the operator are deleted from the disk file. Each time an emitter mode is deleted from the file, a one line warning message is output to the operator:

**LIBRARY EMITTER ANNNAA DELETED FROM LIBRARY

The operator may delete both alpha and numeric emitter modes from the library. If the operator specifies a null response to the ELINT prompt, all emitter modes in the library are deleted.

3.2.2.4 Code 4 - Update Library Emitter(s)

Command code 4 is used to update the EWIR generated data in an existing library file. The operator must have an EWIR tape on line prior to code entry. The operator is prompted to specify the list device; all warning and error messages generated by update processing are output to the designated device. The format of the output messages is identical to that decribed for library file creation.

Update processing reformats old EWIR emitter mode entries and/or creates new emitter mode entries in the library disk file. Update processing is the same as the file creation function with the following exceptions:

a. If the update function is unable to locate an ELINT entry within the library file, it creates a new ELINT entry in the file characterized by additional emitter mode records.
b. If the update function finds an ELINT entry within the file, it replaces current mode data with updated or new mode data for each mode set from the EWIR tape which has been successfully decoded by the update process. The update function appends a numerical mode code to the emitter mode ID as in the library creation process. Hence, numerical mode code assignments made by the update function should be identical to those originally made by the file creation function unless the order of appearance of the data parameter records on the EWIR data base tape has changed within an ELINT system, or, if the operator has deleted digital mode assignments from the library entry.
c. Those emitter modes unsuccessfully decoded by the update function remain unchanged within the emitter library disk file as long as the order of data records within an EWIR ELINT system remains unchanged from tape to tape and the operator has not deleted digital mode assignments from the library. If the digital mode code assignments change in order of appearance or in number during an update calculation, duplicate mode

entries or incorrect mode replacements may occur.

d. All library emitter modes whose label is appended with an alphabetical character remain unchanged in the library file during update processing.

Each time the update processing function updates an old mode or creates a new mode it outputs a one line message to the listing device:

**EMITTER MODE ANNNAN UPDATED BY EMITTER MODE ANNNAM

**NEW EMITTER MODE ANNNAN CREATED

The operator compares the old/new mode assignments to detect any changes in emitter mode designation.

3.2.2.5 Code 5 - List EWIR ELINT System(s)

Command code 5 is used to output EWIR information to the listing device specified by the operator. The operator is prompted to enter the listing device and to enter the ELINT specification. The operator may choose to list EWIR data in any one of the five ELINT modes described in Section 3.2.1. The operator responds to the ELINT prompt with a 5 or 6 character ELINT notation, a pair of alphabetical characters, a single alphabetical character, or a CR entry (display all). The program truncates a six character entry to five characters.

The operator is prompted to enter a code for the type of EWIR information to be output to the list device for each system specified:

TAPE DISPLAY COMMANDS

1	General Information	2	Signal Power
3	Antenna Polarization	4	Scan
5	PW/PRI/PGRI/Multpls	6	Pulsed Frequency
7	CW Frequency	8	Associated Signals
9	Receiver Performance	10	References
11	Comments	12	Purposes
97	All Categories	98	Menu
99	Exit		

ENTER COMMAND, OR 98 FOR MENU:

No further prompts are issued to the operator unless the operator specifies tape display codes 10-12 or 97. EWIR test record output is delimited by a three digit qualifier code (1-999). For tape display commands 10-12 and 97, the task issues a prompt to the operator to specify the text record qualifier. The operator specifies the qualifier in one of three ways.

Response	Mode
CR or NULL response	List all text records.
Single, 1-999, numerical entry	List all text records qualified by the entered number.
Double numerical entry X,Y; each number from 1-999	List all text records qualified by a number greater than or equal to X and less than or equal to Y.

EWIR ELINT System list output is in normal 130-column KILTING format with a SECRET/NOFORN header. The EWIR Classification record information is displayed for each ELINT system listed. List output for the GENERAL INFORMATION category includes Emitter Name records as well as Subfile and Parameter Data records for the General Information Tree Numbers. List output for commands 2-10 is derived from EWIR Subfile and Parameter Data Records for the categories shown above. Commands 10, 11, and 12 list text output derived from EWIR References, Comments, and Purposes record types, respectively.

The EWIR ELINT systems on the tape are sequentially accessed. The tape is rewound each time the List EWIR ELINT System(s) command is initiated. Subsequent searches are in a forwards or backwards direction, depending upon tape position.

When the list output for the specified system(s) is finished, the operator is reprompted to re-enter the tape display code. If the operator responds to the

prom[t with a BACKUP entry, the operator is prompted to enter the ELINT specification for the next system; the tape is not rewound. To exit from the List EWIR ELINT System(s) command, the operator responds to the lun specification prompt with a CANCEL or BACKUP entry.

3.2.2.6 Code 6 - List EWIR Tape Directory

Command code 6 is used to list the ELINT ELNOT notations for all systems on the input EWIR data base tape. The operator specifies the listing output device and then the program rewinds the EWIR data base tape and outputs the information contained in the EWIR Classification records and Emitter Name records sequentially found for each ELINT system on the data base tape. After the information has been output for all systems in the tape data base, the program rewinds the tape and outputs the main command prompt.

3.2.2.7 Code 7 - List Library Emitter Directory

Command code 7 is used to list the ELINT mode notations contained within an Emitter Library disk file. The operator specifies the listing output device and the program outputs a list of the six character mode notations. Each mode notation output is associated with an emitter number (ELINT index plus mode index) and a file record pointer. The emitter number assigned to an emitter mode is a dynamic number which may vary depending upon the create/delete operations of the operator and the create operations of the update function. After the information has been output for all ELINT systems in the library file, the program outputs the main command prompt.

SECTION 4

SCENARIO MAINTENANCE PROGRAM - EDSCN

The scenario maintenance program is a multipurpose program capable of modifying existing scenario files and creating new scenario files in the format required by the ATEWES Realtime Software. It maintains a Situation Display, with topography and platform of interest, similar to the ATEWES Realtime Display. Facilities are provided to specify and input a topography file with a stylus and graphics tablet. Additional facilities enable the user to generate platform events from the same tablet. For a description of the scenario file format and content, consult the Realtime Software documentation. The program is designed to run under the Digital Equipment Corporation's RSX-11M Executive which resides in the Control Subsystem. It is written using the Fortran-IV and Assembly languages supplied with RSX-11M.

4.1 GENERAL OPERATION

The basic functions of the scenario maintenance program are to input events from an existing scenario file on disk (referred to as the input area) or from the operator's terminal and output events to a new scenario file on disk (referred to as the output area), to input platform events (enter new platform, velocity change, turn, or delete platform events) using the graphics tablet and stylus supplied with the display to trace flight paths, to input a topography file from the graphics tablet, alter the topography file, or add to the topography file, and to maintain a graphic Situation Display similar to the ATEWES Realtime Display to facilitate visualization of the scenario geometry. When the program is initiated, the existing scenario header information is displayed. The operator is prompted for new header information, and if graphics support is desired. After responding to these prompts, the first event from the existing scenario is displayed on the operator's console, and is referred to as the current event. Commands are provided to modify or delete events, insert new events, advance the scenario, return to the beginning of the scenario, store and recall emitter characteristics, search for specific references, change or reset the situation display characteristics, insert new events from the graphics

tablet, merge scenario files, and terminate the program. As the scenario is advanced, events are read from the input area and written to the output area sequentially. If the same name is specified for both the input and output files, a new version of the file is created. A new scenario file is created containing the old scenario events plus any modifications made. During an editing session, events need not be inserted in chronological order. As each event is inserted, the scenario file is positioned such that the event is placed at its proper time. Each event is verified to contain data sensible in the context of the scenario at the time of insertion. If the data does not make sense within the context of the existing scenario, the operator is asked to change it. The operator may backup or cancel to exit this forced edit situation. If backup or cancel is used in this manner, all further verification is disabled, although the events are still sorted into proper chronological order as they are written to the output area. Whenever verify is disabled, the ATEWES Situation Display is no longer updated. Once verify is disabled, a Rewind Scenario command will cause it to be re-enabled. The ATEWES Situation Display Processor automatically resumes updating the Display when verify is re-enabled. If a scenario editing session is terminated while verify is disabled, the ATEWES Realtime Software will not execute the scenario file. The scenario can be verified by initiating the scenario maintenance program and specifying the desired scenario file as both the input and output. Once any improper events are edited, the session may be terminated, resulting in a properly verified scenario file. If the new scenario file cannot be successfully created, the original scenario file is preserved. All output scenario files are automatically stored on logical device SC:. Input scenario files are assumed to reside on logical device SC: as well.

4.2 OPERATING INSTRUCTIONS

The program is initiated by selecting Scenario Maintenance from the ATEWES Executive Menu or by entering RUN EDSCN on the operator's console. When the program is initiated, it requests the name of the existing scenario file to be used for input. If a new file is to be created, only a carriage return is input. If a file name is entered but not found, the request is repeated. If the input file is successfully opened, the program displays the first input event and then waits for one of the twenty-one basic commands to be entered. If

the input file was not specified, the program assumes that a new scenario is to be created, and generates an Insert New Event command internally and requests that a scenario event be entered.

When the input scenario is opened, its header information is displayed. The operator has the option of entering a new comment line, updating the map coordinates of the origin, and selecting a new topography file to be used with the scenario. If no change is desired, a carriage return entered in response to each prompt will leave the previous data unchanged. The creation date and time are updated to the current time to complete the header for the output scenario. When entering a new scenario, a comment line should be entered, as there is no existing header text to use as a default. Map coordinates of the origin should be entered as well to insure that data is available for the navigation message.

Next the operator is asked to Enter 1 to Utilize Graphics Display. If topography editing is desired, a 1 must be entered in response to this prompt. Since the ATEWES Situation Display requires an Observer, the next prompt asks the operator to designate an Observer Platform. If a carriage return is entered in response to this prompt, the Observer defaults to platform zero. Next, the operator is asked to Enter 1 to Edit Topography. See section 4.2.1 for information on Topography Editing Mode.

Entering 1 to utilize the graphics display activates the ATEWES Graphic Display Processor. The functions of this processor are to maintain a Situation Display, interface to the Topography Editor, and interface to the Graphic Flight Input Processor.

The Situation Display consists of three display areas, the Scenario Display Interface Parameters, the Scenario Display Viewport, and Platform of Interest Display. The Scenario Display Interface Parameters include Display Range, Heading at Top of Display Viewport, Scenario Time, Display Center Coordinates, and Platform Number on which the Display is centered. The Display Viewport consists of Grids, Topography, and Platform Display. The operator may select one of five different Grids; all four quadrants, or each individual quadrant of a Cartesian coordinate system. The Topography is specified from the Scenario File and is displayed relative to the center platform position. The Topography

is stored in a disk file and has a default extension of .DAT. The Platform Display consists of a marker symbol representing each platform, with a line which is proportional to the platform velocity in a direction relative to the angle at the top of screen attached to the marker symbol. Stationary platforms are represented by an (X) marker symbol, moving surface platforms by a box ([]), and airborne platforms by a diamond (<>). Platforms with a Z coordinate of greater than 100 meters will be displayed with green markers and velocity vectors, while those below 100 meters will be red. An exception is the Observer's Platform, which alternates green and red. To the right of each marker is a number identifying which platform it represents. The third section, Platform of Interest Display, monitors a platform selected with code 16, as described in Section 4.2.2.16. This display includes the platform position, speed, heading, climb rate, range from the observer, direction of approach, and the first five linked emitter ID's.

At the end of an editing session, after selecting Command Code 99, the user is reminded of the input file name and the name of the output scenario file name is requested. Since this need not be the same as the input file name it is possible to create different versions of a base scenario and store them under different names. If the program is unable to open the specified output file, the output file name request is repeated.

4.2.1 Topography Editing Mode

If Topography Editing Mode is selected, the operator's terminal announces that the ATEWES TOPOGRAPHY EDITOR is active. The operator is prompted for an input topography file name. Seperate input and output file names permits a single basic map to be used to create several different specific topographies. If a map is only being added to or changed, a carriage return will cause the input file name to be the same as the file specified for the scenario. If the specified output file does not exist, a new file is created by that name. If editing an existing file, the file's scale of distance is displayed. The operator is directed to designate the center by drawing a vector from the center straight North. If desired, the scale may be changed. Caution should be exercised if a smaller scale is to be used, since portions of a map scaled too large to be displayed may be permanently lost. Once the new scale is entered,

the existing topography is drawn on the Situation Display in the new scale. The Topography Command Codes Menu is displayed if editing an existing topography, otherwise the topography editor defaults to Insert Mode.

TOPOGRAPHY COMMAND CODES

1 Enter Insert Mode	2 Enter Delete Mode
3 Delete Most Recent Segment	4 Color Change Mode
99 Exit	

4.2.1.1 Code 1 - Enter Insert Mode

When inset mode is entered, the color menu is displayed on the operator's terminal.

TOPOGRAPHY COLOR CODE COMMANDS

1 Next Segment White	2 Next Segment Red
3 Next Segment Green	

The operator is prompted to enter a color code. Insert mode may be terminated by typing a nine followed by a carriage return at this time. Once a color is selected, the number of remaining storage locations for vectors is reported and the operator is asked what minimum distance between points is desired. If the number of remaining vectors is dwindling too rapidly, a larger distance filter should be used. After a minimum distance is entered (or carriage return for none), large cross hairs appear on the Graphics Display at the end of the last line drawn, or at the lower left corner of the screen if this is the first topography line to be entered. The cross hairs will follow the relative position of the stylus to the graphics tablet. Once the stylus is positioned where desired, pressing the tip to the map being traced will begin sending points to the control computer for processing. Lifting the stylus tip will be sensed by a micro-switch in the stylus body and will terminate the line being input. The Topography Editor will begin processing the line segment and is ready for more commands as soon as the line is echoed on the Graphic Display screen. The operator will then be asked what color to make the next segment.

This sequence will continue until all vectors are used or the operator enters nine to return to Topography Command Mode in response to the color code prompt. Cancelling back to command mode will cause deletion of the last segment entered, if any, during this insertion session.

4.2.1.2 Code 2 - Enter Delete Mode

The segment numbers are displayed near the beginning of each segment in response to Command Code 2. The operator is then asked which segment number to delete. The segment will disappear form the Graphic Display Screen. If this is the correct segment, a carriage return will return to command mode, otherwise the operator should enter one to restore the segment in response to the prompt. Care should be exercised; after the Enter 1 to Restore That Segment prompt, the segment will be gone, with no way to recover it short of re-entering the line. Upon return to command mode, the numbers are erased from the screen and the deleted segment is gone. Note upon re-entry to Delete Mode, that the segments have been re-numbered; care should be exercised in delete mode.

4.2.1.3 Code 3 - Delete Most Recent Segment

Entering Command Code 3 will cause the most recent segment added to be deleted, no matter how much time has elapsed since it was entered.

4.2.1.4 Code 4 - Color Change Mode

Occaisonally, the color that a line was entered does not look quite as good as was originally thought. For this reason Command Code 4, the color change mode is provided. Numbers of the segments are displayed near their beginning as in delete mode, and the operator is asked to enter the desired color code. Then the segment number to change is requested. The segment color is changed on the Graphic Display screen and the operator is asked to Enter 1 to Restore the segment if it is not the desired segment to change. If a carriage return is input in response to that prompt, the operator is then prompted to select another color and the sequence is repeated until a nine is entered to return to command mode.

4.2.1.5 Code 98 - List Menu

Command Code ninety-eight causes the Topography Command Code Menu shown in section 4.2.1 to be displayed on the operator's terminal.

4.2.1.6 Code 99 - Exit Topography Editing Mode

Entering Command Code 99 followed by a carriage return will exit Topography Editing Mode and enter the main body of the scenario editor.

4.2.2 Scenario Editing Program Commands

The scenario maintenance program has twenty-one commands available to the user. Commands are given by entering a numeric code associated with the desired command. Command codes are assigned as follows:

SCENARIO EDITOR COMMANDS

0	List Next Event	1	Delete Current Event
2	Insert New Event	3	Search for Emitter Reference
4	Search for Platform Reference	5	Search for Time Reference
6	Search for Event Reference	7	Rewind the Scenario
8	Save Emitter Characteristics	9	Recall Emitter Characteristics
10	Edit Current Event	11	Global Deletes
12	Duplicate Current Event	13	Global Edit
14	Edit Display Parameters	15	Reset Situation Display
16	Specify Platform of Interest	17	Enter Graphic Input Mode
18	Merge Scenario	99	Exit

In addition to the basic commands listed in the menu, the operator may always specify command code 98 to display the menu. Note that since command code zero corresponds to listing the next event, it is possible to step through portions of a scenario one event at a time by continually inputting carriage returns.

A special condition occurs when either the end of the input scenario file is encountered or a new scenario is being created. In both of these situations, it is not valid to attempt to read an event from an input scenario file. In fact, the current event is invalid, since it is the flag used to signify the end of file. Therefore, some of the twenty-one commands are illegal at this point and attempts to execute these commands will result in error messages. The commands will be ignored whenever they are not legal. When the end of file has been encountered, the operator is notified of the condition and reminded of the abbreviated command list. At this point, the only valid commands are Insert New Event; Recall Emitter Characteristics; Rewind the Scenario; Global Delete; Global Edit; List Menu; Edit Situation Display; Reset Situation Display; Enter Graphic Input Mode; and Exit. Note that some commands are not valid if Graphics Support was not selected by entering a 1 in response to Enter 1 to Utilize Grpahics Display at the beginning of the editing session. These are Edit Display Parameters, Reset Situation Display, Specify Platform of Interest, and Enter Graphic Input Mode. Individual commands are described in detail below.

4.2.2.0 Code 0 - List Next Event

As noted previously, this is the default command which is executed when either a 0 is entered or by depressing the return key. The current event is written to the work area and the next event is read from the input area. The event just read becomes the new current event and is displayed on the operator's terminal. In general, all data are converted from integer codes back to the format and units used when the values are input. Units used for all output fields are found in Table II. It should be noted that the internal format for data storage is quite different from the formats used for data entry and output. All values are stored in integer format, and in many cases are actually stored as codes representing table values. For this reason, many of the values output will be slightly different from those input due to rounding and table approximations.

4.2.2.1 Code 1 - Delete Current Event

Command code 1 is used to remove an event from a scenario. It is similar to the List Next Event command, except that the current event is not output before reading the next event from the input area. Instead, the current event is overwritten in memory by the next event read in from the input area. Note that the Delete Current Event command is invalid when inputting a new scenario or after an end of file has been encountered when editing an old scenario.

4.2.2.2 Code 2 - Insert New Event

Command code 2 is used to insert new events into any scenario file. The current event is first output to the new scenario file. The user is first prompted to enter the time of occurrence for the new event. The user then selects an event type from Table I in Appendix A.

When the event is fully entered, it is displayed on the user console. The operator may then accept or edit the event data. Once the data has been accepted, the event is written to the output area. The user will again be prompted to enter time of occurrence for the next event. This cycle will continue until a cancel command is given by the user.

4.2.2.2.1 Enter/Update Platform

The user is prompted to select one of the four Platform Event modes as follows.

0 Enter New Platform
1 Platform Reposition Event
2 Velocity Change Event
3 Platform Turn Event

The program then requests, one field at a time, the data specified in Table II in Appendix A.

For an Enter New Platform Event the operator is prompted for platform number, east-west position, north-south position, altitude, heading, velocity, climb rate and platform ID. Platform ID must be specified in limited character set. The legitimate characters are A-Z, 0-9, space, $, ..

A Platform Reposition Event requests east-west position, north-south position, altitude and heading.

A Velocity Change Event prompts the operator for heading, velocity and climb rate.

A Platform Turn Event requests heading, velocity, turn angle and turn time.

4.2.2.2.2 Delete Platform

The user is prompted for the platform number to be deleted.

4.2.2.2.3 Enter/Update Emitter

The user is prompted to enter an emitter identification tag. This emitter I.D. must be specified in a limited character set. The legitimate characters are A-Z, 0-9, space, $, .. The operator is prompted to enter the platform and emitter numbers. The user is then required to select an emitter event type from the following:

1) New 3) New Dependent Signal

2) Mode Change 4) Mode Change Dependent Signal

A New Emitter event can be used to enter any type of emitter, if the emitter is not already entered. A Mode Change event allows any emitter event parameter to be changed. Both types produce emitters which regenerate themselves and output pulses based on their PRI(S). A Dependent Signal emitter is restricted as to signal type, see Appendix H. This emitter will output a pulse only when listed as an associate by another emitter, thus its true PRI is its master emitter's PRI. The program will then request an emitter radiation status.

The user is required to select a frequency type from the Frequency Type List, Table III in Appendix A. Based upon this selection other frequency related data is necessary.

For a Continuous Wave Emitter only a frequency is needed and no PRI/pulse information is requested.

A single frequency emitter requests a frequency, continuous agility and chirp limit.

For a frequency sequence the first request is for the number of pulses in sequence, followed by the frequencies, continuous agility and chirp limit.

A periodic frequency modulation prompts the operator to specify whether the emitter has a pri/modulation sync and is time or pulse based. Next a number of segments is requested. For each segment all modulation paramaters will be requested before a parameter for the next segment ex: Frequency, pattern type, modulation period and modulation amplitude will be requested before Frequency will be requested again. Table IV in Appendix A will be displayed when pattern type is requested. Continouous agility and chirp limit are also necessary.

A frequency switching emitter will prompt the user for the number of segments. A frequency and dwell time will be requested for each segment. A dwell variation will be requested for the first segment. Should the first segment not use a dwell variation the prompt will not be issued again. The actual upper

limit of dwell variation is one half of the dwell time. Continuous agility and chirp limit are requested.

For a discrete agility emitter the operator must select a known or unknown set, and then a number of frequency values in the set. If an unknown set is chosen only a single frequency, discrete agility and chirp limit are needed. The Digital Generator will generate the proper number of values between the frequency input and the frequency plus the discrete agility. This emitter will occupy one Digital Generator slot. A known set requests frequencies for the entire set and a chirp limit. This emitter will occupy one Digital Generator slot for each frequency.

A multibeam emitter will prompt the operator to enter the number of beams. Next the program will request the first two frequencies, at this point and for each beam remaining a beam offset will be requested. A continuous agility and chirp limit are also necessary.

An associated frequency emitter is a single segment periodic modulation whose modulation period is required to be that of its frequency master emitter number. Thus a frequency master emitter number, frequency, periodic pattern type, modulation amplitude, continuous agility and chirp limit are necessary.

In all cases chirp limit will be restricted to the frequency indexed values in Table V in Appendix A, which contains the maximum chirp available from the frequency synthesizer.

Unless the user has selected a Continuous Wave emitter the program will display the PRI type list from Table III in Appendix A. The operator will select a PRI type from the list.

For a single PRI the user is prompted to enter a PRI, pulse width, associated emitter number and continuous jitter.

For a PRI sequence emitter the user is prompted to select single or multiple pulse widths, number of pulses in sequence, and single or multiple associated emitter numbers. The user is then prompted to enter a PRI pulse width and

associated emitter number. Next the second PRI requested. If the operator has selected the multiple option for pulse width and/or associated emitter number they will be requested, only the multiples will be repeated. Continuous jitter is also necessary.

A periodic PRI modulation prompts the user to specify whether the emitter has PRI/modulation synchronmization, is time or pulse based and has a single or multiple pulse widths. Next a number of segments is requested. For each segment all modulation parameters, including PRI, pattern type, modulation period, modulation amplitude, and pulse width, will be requested before any data is entered for the next segment. Modulation parameters for additional segments are then input if the multiple option was selected. Continuous jitter is also necessary.

A PRI switching emitter first prompts the user to specify whether the emitter has a single or multiple pulse widths, the number of segments, and a single or multiple associated emitter numbers. For each, segment PRI, dwell time, dwell variation, pulse width and associated emitter number will be requested. If the first dwell variation is zero it will not be requested again. If the single option was selected for pulse width or associated emitter number, the single field will not be repeated. Continuous jitter is also necessary.

For a discrete jitter emitter the user selects either a known or unknown set and a number of PRI values in set. If an unknown set is chosen only a single PRI, pulse width and discrete jitter are needed. The Digital Generator will generate the proper number of values between the PRI input and the PRI plus the discrete jitter. This emitter will occupy one Digital Generator slot. A known set requests PRI's for the entire set and a pulse width. One Digital Generator slot is required for each PRI in the set.

All emitter types request effective radiated power. A multibeam emitter will request an effective radiated power value for each beam.

Next the Azimuth Scan Type List from Table III in Appendix A is displayed and one is selected by the user.

An azimuth circular scan requests azimuth beam width and azimuth scan period.

An azimuth sector scan prompts the user for azimuth beamwidth, azimuth scan period and azimuth track platform. If track no platform is selected the program requests an azimuth start angle. Next the user is prompted to select whether to have PRI/scan synchronization, and unidirectional or bidirectional. If bidirectional is selected, the program prompts the user to specify azimuth scan return blank or not. Then the user is requested to enter azimuth sector width and elevation scan period sync.

A raster scan prompts the user to enter azimuth beamwidth, azimuth scan period, azimuth start angle, azimuth sector width, number of bars, elevation start angle and elevation sector width. The next prompt will be for scan display status.

A conical scan request azimuth beamwidth, azimuth scan period, scan depth, and track platform number. If the user has selected a non-tracking scan, the program will prompt for azimuth start angle. The operator will select whether to have PRI/scan synchronization and unidirectional or bidirectional. If bidirectional is selected, the program prompts for azimuth scan return blank. Then the user is requested to enter azimuth sector width and elevation scan period. The next prompt will be for scan display status.

A helical scan prompts the user for an azimuth beamwidth, azimuth scan period, number of levels, elevation start angle and elevation sector width. The next prompt will be for scan display status.

An azimuth steady scan will request an azimuth beamwidth and azimuth track platform number. If the operator has selected a non-tracking option, the program prompts the user to enter an azimuth start angle.

An azimuth omni scan requests no additional azimuth scan information.

An azimuth associated scan is a sector scan which is required to have the same azimuth scan period and sector width as the scan master emitter. The user is prompted to enter azimuth scan master emitter, azimuth beamwidth and azimuth track platform number. If the user has selected a non-tracking scan, the

program will prompt for an azimuth start angle. The operator is required to select emitter unidirectional or bidirectional and in the case of bidirectional, to select either scan return blank or no blank.

Unless the operator has selected a multibeam, raster, conical or helical scan, the Elevation Scan Type List from Table III in Appendix A is display for selection.

An elevation sector scan type requires an elevation beamwidth, elevation scan period and elevation track platform number. If the user has selected a non-tracking scan, the program will request an elevation start angle. Next the user is prompted to select whether to have PRI/scan synchronization, and unidirectional or bidirectional. If bidirectional is selected the program prompts the user to specify azimuth scan return blank. Then the user is required to enter an elevation sector width and azimuth scan period sync.

An elevation steady scan requires an elevation beamwidth and an elevation track platform number. If the user has selected a non-tracking scan, the program will request an elevation start angle.

An elevation omni scan does not require any additional elevation scan information.

An elevation associated scan requires an elevation scan master emitter number, elevation beamwidth and an elevation track platform number. If the user has selected a non-tracking scan, the program will prompt for an elevation start angle. The user is requested to unidirectional scan or bidirectional scan. If the user selected bidirectional the program will prompt for elevation scan return blank.

All emitter types will be prompted for scan display, priority flag, missing pulse factor, relative bearing jitter, relative elevation jitter and direct assign synthesizer channel number. If the emitter is not pooled, the user prompted to select dedication status. A FM enable prompt is next, followed by a SPS, TTWS selection prompt.

If the emitter is neither a SPS, TTWS user flags 1, 2 and 3 are requested.

For an SPS and/or TTWS emitter the user is prompted to enter the appropriate pulse offset and pulse width, first for SPS followed by TTWS. An SPS emitter will not request user flag 1. A TTWS emitter will not request user flag 2. User flag 3 will always be required.

Note after user flag 3 is entered error messages may appear at the operator console, see Appendix H for a comprehensive description.

4.2.2.2.4 Delete Emitter Event

The user is prompted to enter the emitter number to be deleted.

4.2.2.2.5 Emitter Off Event

The user is prompted to enter the emitter number to be turned off.

4.2.2.2.6 Emitter On Event

The user is prompted to enter the emitter number to be turned on.

4.2.2.3 Code 3 - Search For Emitter Reference

Command code three is used to search the input area for a reference to a specific emitter. If a cancel command is given in response to the emitter number request, the current event is retained and the program requests a new command. When a valid emitter number has been entered, successive events are read in from the input area and the event type is determined. If it is not an emitter type event, or does not reference the specified emitter, the event is written to the output area and the next event is tried. When a match is found the event becomes the current event and is displayed to the operator. A new command can now be entered. If the end of the input area is reached and no match is found, the command is aborted, and the abbreviated command list is in effect. Note that a Search for an Emitter will not detect any events which reference the platform to which it is linked. Also the Search for Emitter

Reference is invalid after an end of file or when inputting a new scenario.

4.2.2.4 Code 4 - Search For Platform Reference

Command code four is similar to command code three, except that a specified platform is searched for. Events are sequentially read from the input area and written to the output area until an event referencing the specified platform is encountered. If the command is cancelled, the current event is retained. If the end of the input area is reached and no match is found, a warning message is output, the command is aborted, and the abbreviated command list is in effect. Note that a Search for Platform will not detect any events which reference the emitter to which it is linked. The Search for Platform Reference is invalid after an end of file or when inputting a new scenario.

4.2.2.5 Code 5 - Search For Time Reference

Command code five is used to advance the scenario to a specific time. The current event is first written to the output area. The desired time is requested, and events are sequentially read from the input area and written to the output area until a time greater than or equal to the desired time is encountered. The associated event is displayed to the operator and becomes the current event. If the end of the input area is encountered before the desired time is found, a warning is issued, the command is aborted, and the abbreviated command list is in effect. The search for time reference is invalid after an end of file has been encountered or when inputting a new scenario.

4.2.2.6 Code 6 - Search For Event Reference

Command code six is used to locate a reference to a specific event type. Event types are the same as used for the Enter New Event command. Events are sequentially read from the input area and written to the output area until an event of the desired type is found. If the command is cancelled, the current event is retained. If the end of the input area is reached and no match is found, the command is aborted and the abbreviated command list is in effect. The Search for Event Reference is invalid after an end of file or when inputting a new scenario.

4.2.2.7 Code 7 - Rewind The Scenario

Command code seven is used to rewind the scenario file to the beginning. All of the previous commands have the effect of moving forward through the scenario file. There is no way to step backwards a given amount through the scenario. This command moves the current event all the way back to the beginning of the scenario. The remainder of the input area is copied to the output area. The output area just written now becomes the input area and a new version of the output file is created as the new output area. Intermediate versions of the scenario are automatically purged. The first event from the input area is read and displayed, becoming the current event just as when the program was initiated. The program will now accept any of the twenty-one available command codes. After a Rewind, events will be verified as they are written to the output area. Note that once a rewind has been executed, the operator is no longer considered to be entering a new scenario. The program functions as if an old scenario is being edited since the events entered before the rewind can now be read from the initial output area.

4.2.2.8 Code 8 - Save Emitter Characteristics

Command code 8 is used to transfer data from a New Emitter Scenario Event to a Library File Emitter Mode (Section 3). The operator specifies the file name of the ATEWES Library File to contain the saved emitter data. The Library File is a file created by the Library Maintenance program. Scenario event data transferred to the library is used to create a new emitter mode or update an old emitter mode, depending on the emitter ID. Since all library emitters are characterized by a six character label, scenario emitter ID's are extended to six characters with ASCII 'A's, if necessary. If the label matches that of a library emitter mode, the scenario emitter characteristics replace the most likely, minimum, and maximum data values already contained in the library for that emitter. If the label is unique, a new library emitter mode is created; scenario emitter parameters are used to fill all three data sets of the new library emitter mode. The operator uses the Library Maintenance program to edit library emitter mode data sets.

The parameters in scenario event type 3 are identical to those contained in the

library with the following execeptions:

a. Emitter modes are characterized by an edit date and time rather than an event time. Emitter mode edit date and time values are set to current date and time values.
b. DGU slot number is not specified.
c. Scenario Emitter Number is replaced by Library Emitter Number.
d. All associated and master scenario emitter numbers are replaced with six character scenario emitter labels. All scenario emitters not characterized by an emitter ID are assigned a library label of AAAAAA. Prior to using command code 8, the operator must be sure to assign a unique label to each master and associated emitter linked to the saved emitter event. Otherwise, software assigns an AAAAAA ID to all unlabeled emitters, even though those emitters may be characterized by different sets of parameters.
e. Scenario Emitter System Control parameters (i.e., page 5 characteristics (Section 4.2.2.10)) are not transferred to the Emitter Library.

4.2.2.9 Code 9 - Recall Emitter Characteristics

Command code 9 is used to transfer data from a Library File Emitter Mode to a Scenario File New Emitter Event. The operator specifies the file name of the library file from which to recall the emitter data. The library file is created by the Library Maintenance program. Data transferred to the scenario is used to create a New Emitter Event for the scenario emitter number specified by the operator. Emitter characteristics not stored in the library file are assigned zero values. The operator uses Scenario Development command code 10 to edit the scenario event.

The operator specifies the following parameters for each emitter recalled from the library file:

a. Library Emitter Mode Notation
b. Option for most likely, average, minimum, maximum, or random values between limits data sets
c. Scenario Event Time

d. Scenario Emitter Number

e. Scenario Emitter ID

f. Scenario Associated Platform Number

g. Scenario Emitter Numbers for Associated and Master Emitters

4.2.2.10 Code 10 - Edit The Current Event

Using command code ten, it is possible to modify single fields associated with the current event. It operates like a combination of the List Event command and the Enter New Event command, except that all operations are performed on the data of the current event.

If the current event is not an Enter/Update Emitter Event, the entire event is displayed to the operator, with each event parameter identified by a field number listed to the left of it. The operator then selects the event parameter to be modified by entering the appropriate field number. The program prompts the operator to enter the desired field, and then advances sequentially to the next logical field. Any field for which no new data are entered will remain unchanged. If the backup code is entered, the program will redisplay the entire event and allow the operator to select a new field number. Fields edited prior to the backup will retain the latest value entered by the operator.

For an Enter/Update Event the program will display the following:

EDITOR PAGE SELECT

1 - Header Page
2 - Frequency Page
3 - PRI Page
4 - Scan Page
5 - System Control Page

The user is then prompted to select a page to edit. After the selection the program will display the appropriate page in full, with edit field numbers.

The operator then selects the event parameter to be modified by entering the

appropriate field number. The program prompts the operator to enter the desired field, and then advances sequentially to the next logical field. Any field for which no new data are entered will remain unchanged. If the backup code is entered, the program will redisplay the entire page and allow the operator to select a new field number. Fields edited prior to the backup will retain the latest value entered by the operator.

An Enter/Update Emitter Event may have repeated data fields. A repeated field number has both integer and fractional components. The repeated fields are divided into sets. Each member of a set will have the same fractional components. The repeated fields are divided into sets. Each member of a set will have the same fractional component. Equal integer components represent the same parameter type. As an example, field 14.01 is requested after field 13.01, both members of the second set, and before 8.02, a member of the third set.

Several emitter types define parameters on multiple pages. A multibeam frequency emitter requires additional scan page data. A CW emitter needs a channel assignment from the system pages. Editing a CW emitter to a different frequency type necessitates PRI page modification.

After editing the last field on the emitter page or typing return to the edit field number prompt, the page selection is again requested.

When editing is complete, a carriage return terminates the event editing. The edited event is then redisplayed so that the operator can examine the effects of rounding and table conversions to determine the exact values in effect for all parameters. If the event edit is terminated with a cancel command, all of the original event parameters will be retained.

When an Enter/Update Emitter event is exited error messages may appear at the operator console, see Appendix H for a comprehensive description.

4.2.2.11 Code 11 - Global Deletes

Command code eleven is used to delete groups of events from a scenario. The events to be deleted are defined by specifying time, event type, platform number

and emitter number limits. Default ranges are as follows:

Limiter	Low Limit - High Limit
Time	0 - 546 minutes, 7 seconds
Event Type	1 - 6
Platform Number	0 - 255
Emitter Number	1 - 1023

The operator is prompted to enter new limits to override the defaults. If no overrides are entered, a warning is issued and the process restarted. When no lower limit for a given limiter is specified; no high limit is requested. If a low limit is specified, the default for the high limit is set to the low limit. For example, to delete all references to platform 12, all that need be entered is a lower platform limit of 12. If event limits are specified which exclude all platform events, no platform limits are requested. If the event limits exclude all emitter events, no emitter limits are requested. If emitter limits are specified but no platform limits are specified, the platform limits are set to preserve all platform references. Similarly, if no emitter limits are specified, and platform limits are, the emitter limits are set to preserve all emitter references. When all the limits have been specified, the scenario is rewound. The entire scenario is then searched for events satisfying the logical AND of all of the limiters, which are deleted. The scenario is then rewound again, and the first event in the scenario displayed. The program is now ready to accept a new command.

4.2.2.12 Code 12 - Duplicate Current Event

Command code twelve is used to duplicate the current event. The operator is first prompted to enter the number of times to duplicate the event, which may be any event type. The operator then enters an event time increment followed by a platform or emitter number increment. The operator then selects whether each event is to be edited as it is generated. The current event is then duplicated the specified number of times. As each new event is generated, the event time and platform or emitter number are updated using the previously specified increments. If requested, each event is then made available for editing prior

to writing the event to the output area. Note that the last event written becomes the base for the next event when immediate editing is performed. The last event generated becomes the new current event.

4.2.2.13 Code 13 - Global Edit

Command code thirteen is used to edit a single event parameter as a function of event time, platform number or emitter number for a set of events. The scenario is first rewound and the operator then selects the event type to be edited.

For a type one event the operator will choose between Enter New Platform, Platform Reposition, Velocity Change and Turn Events.

For a type three event the operator will specify an emitter page to edit.

The operator then selects, from the console display, the field to be edited, and enters the appropriate field number. The edit is then further defined by specifing an emitter/platform range and time limits based on the event type selected. Only those events within the limits are affected.

A type three event may require the operator to further define the emitters to be affected. As an example, all fields on the frequency page, except field 1, will request the operator to enter a frequency type. If the field number selected is not associated with the type entered an error message is displayed and the edit is terminated.

The operator then inputs a new base value for the selected parameter. If appropriate the program will request a platform/emitter number based increment should the platform/emitter limit range be non-zero. Again, if appropriate and the time limit range is non-zero and a platform/emitter number based increment was not selected the operator is prompted to enter a time base increment.

The entire scenario is searched for events which satisfy the specified limits. The specified parameter is then updated as follows.

VALUE = BASE + INC * (EMIT/PLAT - LOWER EMIT/PLAT LIMIT)

+ TINC * (TIME - LOWER TIME LIMIT)

Where VALUE is the new parameter value, BASE is the base value entered, INC is the emitter/platform based increment entered, if applicable, EMIT/PLAT is the current emitter or platform number, and LOWER EMIT/PLAT LIMIT is the lower limit of the specified emitter/platform range. If applicable, TINC is the time based increment, TIME is the current event time, and LOWER TIME LIMIT is the lower limit of the time range specified. When the end of the input area is reached, the scenario is rewound and the first event is read in and becomes the current event for display. Note that no time limit is allowed when editing the time field.

As each type three event is modified it is verified, as described in Appendix H. If the new emitter is unacceptable the original event will be preserved and the reasons are display on the operators console. This action will have no effect on the remaining edits.

4.2.2.14 Code 14 - Edit Display Parameters

After selecting Code 14, the current Display Parameters listed on the operator's terminal are maximum coordinate values, quadrant code, center coordinate information. The operator is then prompted for maximum coordinate for display. Legal values are 0 through 2000 kilometers. Next, quadrant code is requested; 0 for all, 1 for upper right, 2 for upper left, 3 for lower left, 4 for lower right. A choice is offered between displaying true North at the top of the Situation Display, or the center platform heading at the top. Finally, the operator is given a choice between centering on a given platform, requesting a particular X-Y coordinate to be the center, selecting the center position using cross-hair cursor positioned with thumbwheels, or centering on the observer. If a particular X-Y coordinate is selected, the operator is prompted for X and Y.

4.2.2.15 Code 15 - Reset Situation Display

In response to comand code fifteen, the ATEWES Situation Display is reset to its original parameters. The Display Processor is re-started in an identical fashion to the way it is started at the beginning of the program if the operator

enters a one in response to the Enter 1 To Utilize Graphics prompt.

4.2.2.16 Code 16 - Specify Platform of Interest

When the ATEWES Situation Display processor is active, an area to the right of the situation display is maintained to monitor a Platform of Interest. command code sixteen is provided to enable the operator to select which platform will be monitored in this area. If the platform is inactive, no numbers will be displayed in this area. Note that if no platform has been specified the default is platform zero. Also not that no entry is made in the scenario file as a result of this command. It is provided solely as an aid to visualizing the scenario geometry.

4.2.2.17 Code 17 - Enter Graphic Input Mode

Command code seventeen is provided to simplify entry of platform flight paths. The operator enters a start time, platform number, altitude, platform ID, speed and climb rate on the Situation Display. The operator may then carefully trace a flight path with stylus on the graphics tablet. The Control Computer will then generate Enter New Platform Events, Turn Platform Events, Velocity Change Events, and Delete Platform Events to construct a flight path within the context of the scenario.

Upon entry into this mode, the current display scale is reported on the operator's terminal. The operator is prompted for the heading at the top of tablet, and how much heading change is required to generate a velocity change event. The operator is also asked for a minimum distance between points reported back from the Situation Display. A certain amount of forethought is required for minimum heading change and minimum distance between points. Too small a heading change will cause an excessive number of velocity change events to be generated, as will too small a minimum distance between points combined with an unsteady hand.

Additionally, using a small value for minimum distance will result in excessive processing overhead, defeating the purpose of this mode of input. Using large numbers for these two parameters, on the other hand, may result in unrealistic

scenario events. For generalized event input, a value of ten degrees is suggested for minimum heading change, while a minimum distance of fifteen mm will result in reasonably swift processing.

Note: Platforms entered in Graphic Input Mode should not be re-positioned using Command Code Two Platform Events during the time span covering Graphically Input Events.

After responding to these prompts, the Graphic Input Menu is displayed on the operator's terminal.

GRAPHIC INPUT COMMANDS

0 Enter New Platform Event	1 Enter Next Leg of Flight
2 Turn and Enter Next Leg	3 Delete Most Recent Leg
4 End Platform	5 Change Heading Filter
6 Change Distance Filter	99 Exit

4.2.2.17.0 Code 0 - Enter New Platform Event

Graphic event entry should begin with Code 0. The operator is prompted for Event Time to enter the platform, platform number, Z position, platform ID, speed, and climb rate. After responding to these prompts, the cross-hair cursor will appear on the Graphic Display. At this time, the operator may trace a path of flight for the platform on the Graphics Tablet using the stylus. After the stylus is lifted from the tablet surface, the control computer will process the flight path, generating as many velocity change events as are necessary to reproduce the flight path. When all events are generated and written to the output area, the operator is asked to Enter Command, or 98 for Menu. The remainder of the flight path for the platform just entered should be completed before selecting another Enter New Platform Event.

4.2.2.17.1 Code 1 - Enter Next Leg of Flight

Once a platform has been entered into the scenario, additional events may be entered using Code 1. The operator is prompted for a new speed and climb rate,

and the cross-hair cursor will again appear on the Graphic Display. The next leg of flight can then be entered using the stylus and Graphics Tablet. Once the Control Computer has written the new Velocity Change Events to the output area, the operator is prompted for a new command.

4.2.2.17.2 Code 2 - Enter Turn and Next Leg of Flight

If a Turn Event is desired prior to the next path, Code 2 may be used. The operator is prompted for speed and climb rate. After these values are input, the cross-hair cursor appears. The operator should start to trace the next leg of flight path starting at the end of the turn desired. The turn time will be computed from the speed entered and the distance travelled. The operator should take care to insure that the turn angle is less than 180 degrees. If the turn desired is greater than 180 degrees, the event should be entered using Command Code 2, Insert New Event. See section 4.2.2.2.1 for further information.

4.2.2.17.3 Code 3 - Delete Most Recent Leg

The ATEWES Graphic Input Processor maintains a record of the most recent leg of flight. If the desired path was not properly created, Code 3 may be used to Rewind the Scenario and Search for the events. As each event is found, it is deleted from the scenario. If Graphic Input Mode is exited and re-entered, Delete Most Recent Leg may not be used on flight paths already entered.

4.2.2.17.4 Code 4 - End Platform

Entering Code 4 will delete the current platform at the scenario time of the end of the last leg of flight. It must be used immediately after the last leg of flight has been processed by the Control Computer.

4.2.2.17.5 Code 5 - Change Heading Filter

The minimum heading change to generate a velocity change event may be altered by using Code 5. All Graphic Flight Events entered subsequent to this command will use the new minimum heading value.

4.2.2.17.6 Code 6 - Change Distance Filter

The minimum distance between points may be changed using Code 6. Subsequent Event processing will use the new distance filter.

4.2.2.17.7 Code 98 - Display Menu

Code 98 will cause the Graphic Input Command Menu as shown in Section 4.2.2.17 to be displayed on the operator's terminal.

4.2.2.17.8 Code 99 - Exit

Code 99 causes Graphic Flight Mode to be terminated. The operator will again select from the twenty-one basic ATEWES Scenario Maintenance commands. The Delete Most Recent Leg command will not be valid upon re-entry until a new leg is entered.

4.2.2.18 Code 18 - Scenario Merge

Sometimes it is useful to combine two scenario files. Command code 18 is provided for that purpose. The operator is prompted for the name of the file to be merged with the scenario file presently being edited. Since it is likely that both files have platform or emitter numbers that are the same, an offset may be specified which will be added to each platform or emitter number from the scenario being merged. For instance, if both files have platforms one through twenty assigned, a platform offset of twenty could be specified, causing the merged scenario platforms to number twenty-one through forty. The time may also be offset, permitting the merged scenario to begin at a different time than it does in the original file. Platform, emitter and time offsets may be both positive or negative, providing great flexibility in the resultant scenario. A certain amount of caution must be used, however, if emitter, platform or time results in a value outside of the legal limits, that event will be discarded by the editor and a warning will be issued on the operator's terminal. The resulting scenario file is unverified and unsorted. If the editing session continues, the editor will sort and verify events as they are written to the output area.

4.2.2.19 Code 98 - List Menu

The menu as shown in section 4.2.2 is listed on the operator's screen.

4.2.2.20 Code 99 - Exit

Command code ninety-nine is the normal command used to terminate the program. The user is reminded of the input file name and the name of the output scenario file name is requested. If only a carriage return is input, no output file is generated. If a file is specified, it is created and the scenario is then written into it. If verify is enabled and there is an illegal event is in the scenario file, the operator is asked to edit the errant event. Cancel or backup at this time will produce a scenario file that cannot be executed by the ATEWES Realtime Software. If the specified output file already exists, it is automatically deleted.

As previously noted, it is not necessary to keep scenario events in any specific order when creating and editing scenarios. Events can be inserted at any point in the file, regardless of the time specified for the new event. This is made possible by the sort routine which is automatically executed whenever an event is written to the output area. In addition, all events with equal time fields are sorted in order of increasing event number, so that at a given time all Enter New Platform events will be processed first, then the rest of the platform type events, then the Enter New Emitter events, and finally, the rest of the emitter events. When two or more of the same type of events are scheduled to occur at the same time, they will be processed in order of increasing platform or emitter number.

SECTION 5

LIST SCENARIO PROGRAM

The list scenario program makes it possible for the user to display a scenario to the console, a hard copy printer and/or get a special compressed scenario printout.

The user will enter the name of the scenario file to be listed. The program will display the scenario file header. The operator will be prompted to enter 1 to request a printout of the header.

The user will then select either the terminal or the printer for the display, or a carriage return to exit the program.

If the printer was chosen the user is requested to select the expanded or compressed listing.

The program then displays the default time, platform and emitter limits for the display. The operator may change any limit or use the default limits.

After the last limit prompt is passed, the program will write that portion of the scenario within the limits, in the appropriate form to the selected device. If the user has changed a limit the edit is preserved until the program is exited or re-edited.

When the last event has been displayed, the program outputs an END OF LIST message to the operators console and prompts the user to select the terminal, printer or exit.

SECTION 6

ENVIRONMENT CHARACTERIZATION PROGRAM - ENVR

The Environment Characterization program allows the operator to analyze the pulse density of a scenario file as measured by pulse count data recorded in a DX file. The program accumulates pulse count totals and computes percentages for pulses output, amplitude inhibited, and RF dropped.

6.1 GENERAL OPERATION

The Environment Characterization program processes a DX file and computes statistics regarding the radar pulse environment which was generated. Between operator specified start and stop times, the program outputs pulse density reports at an operator specified report interval. Each report includes data for all active emitters, as well as data filtered by emitter number, frequency and DOA.

6.2 OPERATING INSTRUCTIONS

The program is initiated by selecting Pulse Density Analysis from the ATEWES Executive Menu, or by entering a RUN ENVR command on the operator's console. The operator is prompted to enter the name of the DX file to be characterized. If the file cannot be found, or is not a valid DX file, an error is output and the file name request is repeated. When a valid DX file has been found, the header is displayed and the operator has the option to produce a hardcopy of the header information on the line printer. The operator is then prompted to enter the limits for the emitter number, frequency, and DOA filters. The operator then enters the DX time at which to start and stop characterization as well as the desired report interval. All entries have default values, which may be retained by entering a carriage return for the desired field. The current values for all operator responses are displayed, and the operator has the option to repeat the entire input sequence. When all filters have been specified satisfactorily, the filters are output to the printer with a report heading. Characterization then proceeds until the stop time, end of the DX file, Backup

Scenario, or DX Recording Disable is detected. When characterization completes, the program reports the number of dropped emitters, if any, and returns control to the ATEWES Executive, or the RSX-11M or VMS Executive, depending upon its initiation.

6.3 RESULTS

Each pulse count report contains the DX time of the event which triggered the report, followed by 8 pulse count values. The first value represents the total theoretical pulse density of all active emitters during the report interval, measured in pulses per second. This is followed by the actual pulses output, amplitude inhibited, and RF dropped values, expressed as percentages of total theoretical pulses. The actual output value represents the percent of pulses generated at RF. The amplitude inhibited value represents the percent of pulses not generated because their power level was below receiver sensitivity. The RF dropped value represents the percent of pulses dropped due to contention in the Digital and RF generation subsystems. Significant percentages will occur in the RF dropped field when scenario density exceeds recommended limits. The second set of pulse values represents the same measurements as the first set, except that the values only include emitters which fall within the filter limits specified by the operator. Also, filtered actual pulses output is represented as pulses per second, rather than as a percentage of theoretical pulse density.

SECTION 7

REALTIME SIMULATION PROGRAM - INIRN

The Realtime Simulation Program controls all environment simulation and signal generation. The scenario file is read and executed in real time according to operator specified commands. All signal parameters are loaded into the Digital Generator to initiate pulse generation. The program also records in the DX file a detailed history of all events required to recreate the environment. Operator commands are also provided to support real time monitoring of environment generation through parameter displays and BIT monitor data displays.

7.1 GENERAL OPERATION

The basic function of the realtime program is to read a scenario file and format signal parameters for output to the Digital Generator. The operator first enters the scenario file name and other required initialization data. The program then initializes the Digital Generator, as well as its own memory files. Scenario event execution and motion simulation then proceed under operator control. Commands are provided to start and stop the simulation, set simulated time to a specified point, display emitter, platform and simulator system status. Commands are also provided to support control of the DX file recording, and control of realtime BIT monitors within the Digital Generator. The operator also has the ability to add new signals to the environment defined by the scenario file, or modify the parameters of existing signals.

7.2 OPERATING INSTRUCTIONS

The Realtime Program is initiated by selecting Realtime Simulation from the ATEWES Executive Menu or by entering a RUN INIRN command on the operator's console. The realtime program is actually implemented as a set of programs which run concurrently under control of the RSX-11M Executive. The first initialization procedure is to abort any other realtime programs which may be active due to a previous run which was not teminated normally. This may produce abort messages on the operator's console.

The program then requests the scenario file name and displays the scenario header information. The operator then has the option of overriding the name of the default initialization file to be used. If no name is entered, 'DEFALT.DAT' will be used. If the default file cannot be read, an error message is output and the filename request is repeated. The default file contains data to be used in initializing the system for a new simulation run. Appendix C describes all the data specified by the default file. The operator may then enter up to 72 characters of text to be stored in the DX file header. This text represents any comment concerning the simulation run which the operator may wish to store.

The default initialization data is then displayed, including the Maximum Power, Antenna Pattern and Gain, and Sensitivity file names, the EW system platform number, the test mode indicator, Power Boost and Frequency Disable file names, and RF Channel pooling flags. The operator has the option of accepting or modifying the initialization data, in which case, the operator is prompted to enter each parameter. If no data is entered for a given parameter, that parameter remains unchanged. When the input requests have been completed, the initialization data is displayed and the operator has the option to accept or modify the data. The cancel command may be used to redisplay the data and start over at any time. When the initialization data has been accepted, the Maximum Power, Antenna Pattern and Gain, and Sensitivity files are pocessed and the data is stored in common. If one of the files is not found or contains insufficient data, the operator is prompted to enter a new file name. Use of the cancel command allows the operator to reenter all of the initialization data if he so desires. The initialization information is stored in the DX file header.

The remaining initialization data is now processed. The EW system platform is entered, and linked to emitter number zero and appropriate data is passed to the Digital Generator. The scenario is set to normal speed, and radiation is initially turned off, but it will automatically be turned on as soon as the scenario is started the first time. All scenario events scheduled to occur at time zero will be processed. The elapsed time will remain at time zero and no pulse count data will be read until the scenario is started the first time.

There are twenty four commands avalable to the operator to control the real time simulation. If code ninety eight is entered in response to a command request, a

list of the valid commands and their command codes is displayed on the operator's console. Commands are given by entering the numeric code corresponding to the desired command. Command codes are as follows.

Code	Command	Code	Command
1	Start Scenario	2	Stop Scenario
3	Set Scenario Speed	4	Radiation Off
5	Radiation On	6	Advance the Scenario
7	Backup the Scenario	8	Initiate Automatic Repeat Loop
9	Set Pulse Counter Periodicity	10	Spectrum Analyzer Control
11	Set DOA Test Point	12	Display Latest Pulse Count
13	Disable Recording of All Events	14	Display System Status
15	Edit Filter Limits for Status	16	Edit Situation Display Parameters
17	Reset Situation Display	18	Enter Scenario Event
19	Display Emitter Mapping	20	Display Emitter Parameters
21	Display Platform Parameters	22	Display Active Emitter List
23	Display Active Platform List	99	End Simulation Run

7.2.1 Code 1 - Start Scenario

The Start Scenario command is used to initiate all real time processing. The command has an optional stop time parameter. If a stop time of zero is specified, real time processing will continue until suspended by a Stop, Advance, or Backup Scenario command. If a stop time is specified, real time processing will automatically be suspended when the simulated time reaches the specified value. Before the scenario is started, the radiation is turned on if this is the first Start Scenario Command and no Radiation Off command has been previously issued. Simulated time is periodically advanced according to the scenario speed. Platform positions are updated and emitter bearings and attenuations are calculated and output to the Digital Generator. The position of the EW system platform is periodically output to the observer. Events from the scenario are processed as simulated time advances.

7.2.2 Code 2 - Stop Scenario

The Stop Scenaro command is used to suspend all real time processing. Simulated time is frozen at its current value, as are all platform positions and emitter bearings and attenuations. The current position of the EW system platform is output to the observer. Although simulated time is frozen, an internal clock still continues to update the elapsed time since the program was initiated. The Stop Scenario command overrides any automatic stop time specified, and cancels any Automatic Repeat Loop command in effect at the time. The scenario speed is not affected.

7.2.3 Code 3 - Set Scenario Speed

Command code three is used to modify the scenario speed. It is possible to have simulated time advance at a rate other than actual elapsed time. The new scenario speed is input as a power of two, with the valid speed codes ranging from minus three to three. This allows for scenario speeds in the range from one eighth to eight times normal time. A speed code of zero sets the scenario to normal speed. The Set Scenario Speed command may be issued when the scenario is either running or stopped, and has no effect on any automatic stop time or Automatic Repeat Loop currently in effect.

7.2.4 Code 4 - Radiation Off

Command code four is used to turn off all RF radiation. When this command is issued, the Digital Generator is commanded to suspend radiation. All real time processing continues and all emitter parameters are kept up to date. Scenario events continue to be processed as simulated time advances.

7.2.5 Code 5 - Radiation On

Command code five reverses the affects of command code four. The RF radiation is turned on, and all other aspects of the simulation remain unchanged. If the scenario has never been started, the elapsed time clock will be started, as if the scenario has been started the first time. The Radiation On then takes effect immediately.

7.2.6 Code 6 - Advance the Scenario

Command code six advances the scenario to the specified time. If the specified time is less than the current simulated time, a warning is issued and no action is taken. This command overrides any automatic stop time or Repeat Loop currently in effect. The radiation is first turned off, and then the simulator is run as fast as possible until the specified simulated time is reached. All platform positions and emitter bearings are updated, and all scenario events up to and including the advance time are performed. When the advance time has been reached, the radiation is turned back on if it was on before the advance command was issued. All real time processing is now suspended and will not be resumed until a Start Scenario or Initiate Automatic Repeat Loop command is given.

7.2.7 Code 7 - Backup The Scenario

The Backup Scenario command is smilar to the Advance Scenario command except that the time specified is less than the current simulated time. If the specified time is greater than the current simulated time, a warning is issued and no action is taken. This command also cancels any automatic stop time or Automatic Repeat Loop currently in effect. The RF radiation is turned off, and all emitters and platforms are deleted from the system and turned off in the Digital Genertor. Simulated time is set to zero, and the scenario is processed fr he beginning until the target time is reached. All platform positions and em bearings and attenuations are updated. When the target time is reached, the RF radiation is turned back on if it was on when the backup command was issued. Real time processing will not resume until a Start Scenario or Initiate Automatic Repeat Loop command is given.

7.2.8 Code 8 - Initiate Automatic Repeat Loop

Command code eight is used to Initiate an Automatic Repeat Loop. Both a start time and stop time are specified. The program determines whether the scenario must be advanced or backed up to the start time, and action is taken as described above for the Advance or Backup Scenario commands. The scenario is automatically started, and will run until the stop time is reached. The scenario is then automatically stopped, backed up to the start time, and

restarted. The program cycles in this fashion until a Stop Scenario, Advance Scenario, or Backup Scenario command is issued. While the Repeat Loop is being executed, any of the other commands may also be processed. When the scenario is backed up, the scenario speed is preserved. The scenario speed may also be modified once the repeat cycle has been started. However, any operator entered scenario events are lost whenever the scenario is backed up.

7.2.9 Code 9 - Set Pulse Counter Periodicity

Command code nine is used to define rate at which the pulse count data are to be recorded in the DX file. The emitter counters accumulate the total number of pulses output, pulses inhibited by amplitude threshold, and pulses dropped due to lack of Digital or RF Subsystem capacity. The operator is prompted to enter a new periodicity, which may be from .02 to 4 seconds. Once each period, the counters are read and cleared, and pulse counts for all radiating emitters are recorded in the DX file. When the program is initiated, the default period is once per second.

7.2.10 Code 10 - Spectrum Analyzer Control

Command code ten provides basic control of an HP 8566A Spectrum Analyzer. The program displays a Spectrum Analyzer Control menu, which includes the following commands:

Code	Command	Code	Command
1	Reslotuion Bandwith	2	Sweep Time
3	Input Attenuation	4	Center Frequency
5	Frequency Span	6	Start Frequency
7	Stop Frequency	8	Reference Level
9	CF Step Size	10	Display Line Enter
11	Display Line Off	12	Step Up
13	Step Down	14	Clear-Write A
15	Clear-Write B	16	Max Hold A
17	Max Hold B	18	View A
19	View B	20	Blank A

21	Blank B	22	Trigger Line
23	Trigger External	24	Trigger Video
25	Trigger Free Run	26	Full Span 0-2.5
27	Full Span 2-22	28	Save N
29	Recall N	30	Reset Analyzer
31	Manual Command	32	Tune to Emitter
33	Auto Scan Active Emitters	99	Return to Main Menu

For fields 1 through 10, the program also maintains the last value entered for each parameter as part of the menu display. The operator then selects a command from the menu.

For fields 1 through 10, the operator is prompted to enter a new value, which is then output to the spectrum analyzer. If no new value is entered, the selected field is simply addressed in the analyzer, making it available for changes using the Step Up and Step Down commands. For commands 11 through 27, the appropriate control codes are output to the analyzer. For commands 28 (Save N) and 29 (Recall N) the operator is prompted to enter the number of the memory to be saved or recalled. For the Reset command control codes are output which reset the spectrum analyzer to its initial power-up state. Command code 31 allows the operator to enter any ASCII string which forms a legal spectrum analyzer command. The string is output to the analyzer exactly as entered by the operator. For command code 32, the operator is prompted to enter the number of the emitter to which to tune. If the emitter is inactive an error is output and the emitter prompt is reissued. When a valid emitter has been selected, the spectrum analyzer is reset, the center frequency is set to the frequency of the emitter and the frequency span is set to 10 Mhz or the sum of any frequency modulations whichever is greater. The peak power and frequency are measured and displayed along with the PRI and scan period of the emitter. Command code 33 instructs the realtime program to sequentially tune to all the currently active emitters. The display for each emitter is frozen for five seconds, or two times the scan period, whichever is greater, before advancing to the next emitter. An error is output if no active emitters are found. Command code 99 returns the operator to the main realtime command menu.

7.2.11 Code 11 - Set DOA Test Point

Command code eleven is used to specify which DOA Test point is to be monitored at the RF test output point. This point is available for monitoring of a selected RF Distribution DOA Port output in real time. The operator is prompted to enter the desired DOA, or zero to disable the test point output.

7.2.12 Code 12 - Display Latest Pulse Count For Emitter

Command code twelve allows the operator to display the latest pulse count for a specified emitter. The program requests the emitter number and is then suspended until the next time the pulse counters are scheduled to be read. This may suspend the program for up to four seconds, depending on the current periodicity. When the pulse counts have been transferred, the count total for the specified emitter for each mode is displayed. An error message is output if the emitter has not been entered into the system.

7.2.13 Code 13 - Disable Recording of All Events

Command code thirteen is used to disable all event recording to the DX file. All events previously written to the DX file are preserved, but no future data will be recorded. A verification code is required to prevent accidental disables since no reenable function is provided.

7.2.14 Code 14 - Display System Status

Command code fourteen is used to obtain a snapshot display of the current system status. Both the simulated and elapsed times are displayed, followed by the EW system platform parameters. The program then displays the total number of active platforms, emitters, and detectable emitters excluding the EW system platform and emitter zero, as well as the number of platforms and emitters within the limits specified under command code fifteen, described below. An emitter is detectable if its current total attenuation value is less than its threshold value, meaning that its main beam should be detectd by the EW system unless pointed away from it.

The scenario speed and status are displayed, followed by the RF status. The latest pulse count totals for all active emitters in all modes are displayed. The number of dropped emitters since the last display is output, and the counter is then reset for the next display.

7.2.15 Code 15 - Edit Filter Limits for Status

Command code fifteen is used to edit the range, direction of arrival, and frequency limits used in filtering the active platforms and emitters in all system status displays. The program first displays the current values for each of the filters. The operator is then prompted to enter new values for the range lower and upper limits, direction of arrival to the EW system lower and upper limits, and frequency lower and upper limits. Where no new values are entered, the old limits are retained. The resultant values are stored for use by all subsequent system status displays.

7.2.16 Code 16 - Edit Situation Display Parameters

Command code sixteen is used to edit the situation display parameters. The current values are first displayed to the operator, who is then prompted to enter new values for each parameter. Where no new data are entered, the old values are retained. The operator is prompted to enter the maximum X or Y coordinate to be displayed, the quadrant desired, and a code specifying whether whether the center platform heading or true north should be displayed at the top of the screen. The operator then enters a code specifying whether the EW system, an arbitrary platform, an arbitrary X,Y position or cursor coordinates should be at the center of the display. If an X,Y position is specified, the operator is prompted to enter the desired location. If cursor coordinates are specified, the input cursor is enabled on the display and the operator selects the desired location. the operator is then prompted to enter the platform of interest. The right side of the situation display maintains the current position and velocity of the current platform of interest, as well as the ID's of the first five linked emitters. The new parameters will take effect the next time the display processor begins a display update.

7.2.17 Code 17 - Reset Situation Display

Command code seventeen is used to reset the situation display. The display terminal is cleared, and all display data are reloaded. The display parameters are reset to their initial values, with the maximum coordinate set to 2000 KM, all four quadrants displayed, the EW system position at the origin, and the EW system heading at the top of the screen. The program will not accept further commands until reinitialization of the display terminal is complete.

7.2.18 Code 18 - Perform Scenario Event

Command code eighteen allows the operator to manually input any event which can be specified by the scenario.

The program prompts the operator to enter each field associated with the specified event, following the same procedure used when entering new events into a scenario file. When all necessary data has been input, the event is executed. As the event is executed, the platform or emitter number is checked for validity. If the event cannot be processed, a warning is issued and no action taken. When entering a new emitter, the new emitter is automatically mapped to emitter slots above those reserved for scenario emitter usage. An error is reported if enough emitter slots are not available. When updating an existing emitter, an error is reported if the new emitter will require more emitters than are currently used by the emitter.

When the operator enters a new platform or makes a motion change on an existing platform, that platform is labeled as an "operator's" platform, and scenario events which attempt to change its motion are ignored. Similarly, when the operator enters a new emitter, or updates or turns an existing emitter on or off, that emitter is labeled as an "operator's" emitter and any future scenario events which attempt to change its status, except a delete, are ignored. This "operator's" status remains until the end of the simulation run or until the platform or emitter is deleted either by the operator or by a scenario event, or by a Backup Scenario command. Although the operator event is recorded in the data extraction file, it affects only the current run and does not cause a change in the scenario.

Whenever an error is detected in processing the event, the operator has the option of editing and reexecuting the event. If editing is selected, the processing is identical to the Edit Current Event command of Scenario Maintenance program, except that time is not edited.

7.2.19 Code 19 - Display Emitter Mapping

Command code nineteen is used to display the current mapping status of operator emitters to ATEWES Digital Generator slots. Information displayed includes each active operator emitter number and the corresponding ATEWES slot number. Emitter mapping is displayed in blocks 140 emitters. The operator is prompted to enter a carriage return to advance to the next block when there are more than 140 active emitters.

7.2.20 Code 20 - Display Emitter Parameters

Command code twenty is used to display all of the parameters associated with a given emitter. If the emitter is not active, an error is returned. Otherwise, platform data is displayed followed by all emitter parameters.

The operator then has the option of editing the emitter parameters. If an edit is specified a Mode Change is automatically generated. The operator has the option of editing any emitter parameter as in the Edit command of the Scenario Maintenance Program. Once an edit has been specified, an Update event is generated unless the cancel command is issued.

7.2.21 Code 21 - Display Platform Parameters

Command code twenty one is used to display a set of platform parameters. The operator is prompted to enter the number of the platform to be displayed. If the platform is inactive or the EW system, an error is returned and the platform prompt repeated. When a valid platform has been selected, platform data is displayed, followed by the emitter number, frequency and output power of the first 64 emitters linked to the platform. If more than 64 emitters are linked, a prompt is issued and successive blocks of 64 emitters are displayed following

each carriage return until all emitters have been displayed. The cancel command may be used to inhibit display of more than the first block of emitters.

7.2.22 Code 22 - Display Active Emitter List

Command code twenty two is used to display the list of currently active emitters, in blocks of 140 emitters. After each block, a prompt is issued and the next block is displayed after entry of a carriage return until all active emitters within the frequency, range and DOA limits specified for the system status display (Section 7.2.15) have been displayed. For each active emitter, the display includes three single character state flags. Each flag may have two states, blank or active. The active states are defined as follows:

O	Emitter is On
B	Emitter is Below Horizon
D	Emitter is Detectable

7.2.23 Code 23 - Display Active Platform List

Command code twenty three is used to display the list of currently active platforms in blocks of 80 platforms. After each block, a prompt is issued and the next block is displayed after entry of a carriage return until all active platforms have been displayed. The display includes the platform number and range for each active platform within the range and DOA limits specified for the system status display. The cancel command may be used to terminate the display before all blocks have been processed.

7.2.24 Code 99 - End Simulation Run

Command code ninety-nine is used to end the current simulation run. All real time programs are aborted and the RF radiation is turned off. The operator is prompted to enter the name of the DX file to be created. If no name is entered, the work file is deleted. Otherwise, the work file is renamed to the specified file. If the file cannot be renamed, an error is returned and the input request is repeated. When the DX file has been successfully deleted or renamed, the program is terminated and control is returned to the ATEWES Executive Menu or

the RSX-11M Executive.

SECTION 8

SYSTEM UTILITY SERVICES

The System Utility Services are selected from the Executive Menu. When selected, the list of system utilities is displayed and the operator is prompted to enter a selection code. If the operator does not enter a code before pressing RETURN, control is passed back to the Executive Menu.

The System Utility Services are available for backing up discs, restoring discs from a backup tape, deleting files, renaming files, purging discs, removing DX discs, loading new DX discs, and editing files.

Whenever a System Utility Service requires a file name the operator will be prompted to enter the file specification. If neither a file extension nor a device is specified with the file name, the service will display a list of file types. The operator must then select the proper file type by entering the appropriate code. The list of file types and their default extensions and psuedo-devices are as follows.

Code	File Type	Extension	Psuedo-device
1	Scenario	.SCN	SC:
2	DX file	.DX	CR:
3	Emitter Library	.LIB	CR:
4	Correlation	.COR	CR:
5	Topography	.DAT	TO:

8.1 Make Backup

The Make Backup service is used to save an image on magnetic tape of one or both of the system discs. The operator is asked to specify which disc, Scenario, DX or both, is to be written out to magnetic tape. An available tape must then be loaded on the tape drive. The operator is asked to enter a 1 when the tape has been loaded and the backup may proceed.

The Backup tape is written out using the standard RSX-11M Backup and Restore Utility (BRU). If ever a disc needs to be restored from the backup tape, the BRU utility is used to read back the backup data. To recover a few selected files the backup tape the Recover File From Backup Tape service from the System Utility menu.

8.2 Recover File From Backup Tape

The Recover File From Backup Tape service allows the operator to read a file from a backup tape made using the Make Backup service. When this service is selected the operator must load the backup tape on the magtape unit. The operator is then prompted for the file name. The backup set on the tape is scanned and if the file is found it is written to the appropriate computer disc. When the file has been read in or the end of tape is encountered, control is passed back to the Control Menu.

8.3 Delete File

The Delete File service allows the operator to delete all occurences of a file from the discs. The file name is entered and the operator is asked to enter a 1 to verify the file is to be deleted. If a 1 is entered then all occurences of the file are deleted from the disc.

8.4 Rename File

The Rename File service allows the operator to rename a disc file. The operator is asked to enter the old file name and the new file name. When both names have been entered the old file is renamed to the new file. Only the latest version of the file is renamed.

8.5 Purge Files

The Purge Files service allows the operator to purge the Scenario or DX disc. Purging deletes multiple occurences of all files on the selected disc. Only the latest version of each file is kept. When this service is selected the operator is ask to specify which disc is to be purged. Purging the disc will usually

free up disc space.

8.6 Dismount DX Disc

The Dismount DX Disc service is used to logically remove the DX disc from the system. When the DX disc is dismounted from the system, normal DX recording cannot occur. Selecting this service dismounts the DX disc from RSX-11M. The operator may then remove the disc pack from the drive. A new DX disc may then be placed in the disc drive and mounted using the Initialize and Mount services.

8.7 Initialize DX Disc

The Initialize DX Disc service is used to prepare a new DX disc for data recording. When this service is selected the operator is asked to verify that an initialization can be performed. Initializing a disc destroys all existing data on the disc. Initialization should never be performed on a disc that has data that should be saved.

The DX disc must have been previously dismounted and removed before a new DX disc can be initialized. After the disc is initialized the disc is mounted and is available for DX recording.

8.8 Mount DX Disc

The Mount DX Disc service allows the operator to logically mount a DX disc that has been dismounted or initialized. The mount service makes the disc available for data recording.

8.9 Edit File

The Edit File service allows an operator to execute the EDI editor available under RSX-11M. The operator is asked to enter the name of the file to be edited. The EDI text editor is then invoked with this file name. Upon exiting of EDI control is returned to the Executive Menu.

SECTION 9

FILE TRANSFER UTILITY

The File Transfer Utility allows files to be sent to or received from a VAX computer. The method of transfer is via magtape or a serial link between the two computers. The File Transfer Utility is invoked by selecting the proper code from the Executive Menu.

When the program is executed the operator is asked whether files are to be sent to the VAX or retreived from the VAX. The operator is then prompted to enter the method of transfer. If magtape is to be used for transferring files, a tape is written on one computer and then read on the other. If serial transfer is selected the RS232-C interface cable must be properly connected between the PDP-11 and VAX.

Whenever a File Transfer program requires a file name the operator will be prompted to enter the file specification. If neither a file extension nor a device is specified with the file name, the list of standard file types will be displayed. The operator must then select the proper file type by entering the appropriate code. The list of file types and their default extensions and psuedo-devices are as follows.

Code	File Type	Extension	Psuedo-device
1	Scenario	.SCN	SC:
2	DX file	.DX	CR:
3	Emitter Library	.LIB	CR:
4	Correlation	.COR	CR:
5	Topography	.DAT	TO:

9.1 Magtape Transfers

If the operator has selected the magtape for transfers, a tape must be loaded on the tape drive and placed on-line. The program will then ask for a 1 to be entered when the tape drive is ready.

When sending files to the VAX a scratch tape should be used. When the tape is written onto by the program, all previous data on the tape is lost. The scratch tape should be mounted with the write enable ring. The program will prompt the operator to enter the name of each file that is to be written out to the tape. When all files have been written out to tape the operator should unload the tape a take it to the VAX to be read. The complement program for reading the data of the tape onto the VAX is called XFER.

When receiving files from the VAX the tape that is written by XFER on the VAX should be loaded on the tape drive. The write ring should be removed to prevent accidental writing on the tape. After the tape is loaded and on-line the program will prompt for a 1 to be entered before proceeding. The program then prompts the operator to enter the name of each file that is to be read off the tape. The file name should be typed in exactly as it was typed on the VAX as the tape was written. A list of the files on the tape may be displayed by entering a BACKUP request when asked for the file name. When all files have been retrieved the operator will press RETURN and control will be passed back to the initial menu. Entering a code of 99 will return control to the Control Menu.

9.2 Serial Transfers

When serial transfer is selected the files are exchanged between computers via the RS232-C serial interface line. The PDP-11 program initiates a logon request to the VAX. Once logged on, a program called XFR is run on the VAX. All requests are sent by the PDP-11 to the XFR program running on the VAX. The VAX logon procedure and file transfer operations take place without operator intervention. The operator needs only to enter the appropriate file names to be transferred.

When sending files to the VAX, the operator will enter the name of the file to be sent. The operator will continue to enter file names until all files have been sent. Making a null entry will return control to the initial prompt of the transfer program.

When retrieving files from the VAX the operator will enter the name of the file

to be retrieved. The operator will continue to enter file names until all files have been retrieved. Making a null entry, will return control to the initial prompt of the transfer program.

If an error is encountered during transfer via the serial link, an appropriate message is displayed at the operator terminal, see below. If the error message indicates that an error was detected by the VAX program, then an error message is written in a file named OUTPUT.LIS on the VAX.

9.3 Error Messages

The following error messages may be display by the File Transfer program. The error may be corrected retrying the operation as indicated.

TAPE I/O ERROR xxxxxx

An error has been encountered during a read/write operation with the tape. The xxxxxx number is the actual error code returned to the program from RSX-11M. Retry the operation.

FILE OPEN ERROR (NOT FOUND?)

The file cannot be found. Check the file specification and retry.

FILE I/O ERROR xxxxxx

A hard error was encountered when reading the file from disc on the PDP-11. The xxxxxx number is the actual error code returned to the program from RSX-11M. Retry the operation.

FILE NAME PARSING ERROR

The file name entered by the operator is in error. Either the file does not exist or the operator entered an illegal character in the file specification

COMM ERROR, NEITHER ACK NOR NAK RECEIVED

The PDP-11 and VAX are out of synchronization. The program must be restarted via the Control Menu. The problem may indicate

that the VAX is not on-line with the PDP-11, the logon procedure has not worked, or the serial line has been disconnected. Check the current status of the VAX and the serial line cable before restarting the program.

HOST SYSTEM ERROR CODE xxx (OCTAL)

An error was detected on the PDP-11 while communicating with the VAX. The error is typically caused by disc read/write failure. The number xxx indicates the RSX-11M system error code returned to the program.

ASSIGN/ATTACH ERROR FOR INTERFACE PORT

The interface port for the serial link has not been properly allocated or configured for transfers between the VAX and PDP-11.

DIRECTIVE ERROR IN HOST PROGRAM

This error indicates a internal bug check has turned up a software failure. Restart the program from the Control Menu to correct the problem

COMM ERROR, TIMEOUT RECEIVED

The PDP-11 did not get a response from the VAX within the allowable time limit. This may be caused by poor response times on the VAX due to over loading or the serial line has been disconnect while transfer were in progress. After checking the status of the VAX restart the Transfer program from the Control Menu.

MAXIMUM BUFFER SIZE EXCEEDED, FILE RECORD TOO LARGE

The record size of the file being transferred via the serial link is too large. The file must be transferred by magtape. If this occurs with a standard TEWES file type, then the file has possibly been corrupted.

ERROR RETURNED FROM OTHER COMPUTER

The VAX program detected an error during processing. The actual error message from the VAX is displayed on the next line. Typically

the error indicates that the requested file cannot be found on the VAX. Verify that the file exists on the VAX before proceeding.

COMM ERROR, VERIFICATION OF FILE SIZE SHOWS RECORD/BYTE COUNT IS NOT THE SAME ON BOTH COMPUTERS

A redundancy check has shown that the file might has been garbled during transfer. Restart the Transfer program and transfer the file again.

LOGICAL RECORD NUMBER MISMATCHED

A communication error has been detected. Restart the File Transfer program and transfer the file again.

PROTOCOL ERROR, ATTRIBUTE ARRAY IN ERROR

A communication error has been detected. Restart the File Transfer program and transfer the file again.

ABORT REQUESTED FROM OTHER COMPUTER

An error has been detected by the VAX which requires that the transfer be aborted. If this message appears in OUTPUT.LIS on the VAX, then it was the PDP-11 that detected the fault and notified the VAX to abort. Restart the File Transfer program and transfer the file again.

COMM ERROR, MAX RETRY COUNT EXCEEDED

A communication error has been detected that cannct be corrected by the program. Restart the File Transfer program and transfer the file again.

SECTION 10

FAULT TESTING SOFTWARE

The fault testing program is an aid in diagnostic testing of the TEWES hardware. The program utilizes an HP 8566A spectrum analyzer to monitor RF outputs during the testing process. A Digital Pulse Memory is used to analyze pulse descriptors output by the Digital Generator. The program is designed to run under Digital Equipment Corporation's RSX-11M Executive which resides in the Control Subsystem. It is written using the FORTRAN-IV and Assembly languages supplied with RSX-11M.

10.1 GENERAL OPERATION

The basic function of the fault testing program is to provide extensive testing of the ATEWES hardware. The program is organized as a series of tests and subtests. Commands are provided to run the full set of tests, a single test, or a single subtest. A test or subtest can be looped on until failure if desired. Data files are used for parametric control of the tests. These files are stored on logical device DG:.

The fault testing program has forty-four commands available to the user. Commands are given by entering a numeric code associated with the desired command. Command codes are assigned as follows:

DCU TEST MENU

0.0	Run All Tests	1.0	Parameter Storage
2.0	Basic Processing	2.1	Basic PRI Subtest
2.2	Density Subtest	3.0	Pulse Analysis
4.0	Emitter Link	4.1	Sequence Link
4.2	Link Code Jitter	4.3	Sync Emitter Link
4.4	Repeat Count Link	4.5	Pattern Switch Link
5.0	Data Paths	6.0	PRI Generation
6.1	PRI Modulation	6.2	PRI Jitter
7.0	RF Generation	7.1	RF Modulation
7.2	Frequency Agility	8.0	Azimuth Scan
8.1	Azimuth Scan Rate	8.2	Azimuth Sector Width
8.3	Azimuth Beamwidth	8.4	Azimuth Antenna Pattern
9.0	Elevation Scan	9.1	Elevation Scan Rate
9.2	Elevation Sector Width	9.3	Elevation Beamwidth
9.4	Elevation Antenna Pattern	10.0	Receiver Scan
16.0	Enable Trace	17.0	Disable Trace
99.0	Exit		

RF TEST MENU

0.0	Run All Tests	11.0	RF Management
11.0	Data Paths	11.2	Channel Allocation
12.0	Freq. Synthesizer	12.1	Freq. Accuracy
12.2	Output Power	13.0	Pulse Modulation
14.0	Chirp	15.0	Freq. Distribution
16.0	Enable Trace	17.0	Disable Trace
99.0	Exit		

Command code 97 lists the DGU test menu, and code 98 lists the RF test menu. Commands not listed here are invalid and are ignored by the program.

10.2 OPERATING INSTRUCTIONS

The Fault Testing Program is initiated by selecting Fault Testing from the

ATEWES Executive Menu or by entering a RUN FLTST command on the operator's console. When the program is initiated, it makes a quick check to determine if the Digital Generator (DGU) responds to commands. If the DGU does not respond to commands, it is assumed to be offline. In this case, the operator is asked to enter a "1" to continue with program operation, the program exits otherwise. At the start of fault testing the operator is given the option to make a readiness check of the TEWES hardware. The readiness check performs a basic test of the TEWES hardware. Any faults detected during the readiness check are reported to the operator console. The program proceeds to its basic command point. Any of the forty-four commands accepted by the fault testing program can be entered at this point.

If a command is entered to run a test or subtest two additional prompts are given. First, the operator is given the choice of looping on the test or not. Looping on a test proceeds until an error occurs or the operator enters any character. Next, the operator is asked if he desires to override the default data files or not. When this option is selected, the operator is allowed to specify a different data file for that particular test to use for its parameters.

10.2.0 Code 0 - Run All Tests

Command code zero is used to run tests 1-15 automatically in sequential order. Looping on test and filename override options are not valid in this mode. Once testing has begun, any character entered at the console will result in test termination at the end of the current test.

10.2.1 Code 1 - Parameter Storage

Command code one is used to run the DGU Parameter Storage Test. The user is first asked if he desires to loop on the test, or execute it once. The program then prompts the operator to enter the code number for the pattern to test with, or 0 for all. The numbers correspond to the following patterns.

Code	Pattern
1	All Bits Zero
2	All Bits One
3	0101010101
4	1010101010
5	Emitter Number
6	Traveling 1 Bit
7	Traveling 0 Bit

The program will notify the operator if any parameter memory comparison errors are detected. If trace is enabled, the current pattern number and operation (read or write) is output to the console. If looping is enabled, the program loops through the pattern(s) specified until a character is entered at the keyboard.

10.2.2 Code 2 - Basic Processing

Command code two is used to execute the Basic Processing Test. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data filenames or not. The Basic Pri subtest and the Density Subtest are then executed as described below. If looping is enabled, the Basic Pri and Density Subtests are alternately executed until any character is entered at the console, or an error occurs.

10.2.2.1 Code 2.1 - Basic PRI Subtest

Command code 2.1 is used to execute the Basic PRI Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The Basic PRI subtest then executes as described below. If looping is enabled, the basic pri subtest executes until an error occurs, or until any character is entered at the keyboard.

The Basic PRI Subtest begins by prompting the operator for the DGU initializing filename if he selected the file override option. The default file is INI2DGU.DAT. The program interprets this file and initializes the DGU accordingly. The format for this file is described in Appendix E. The program

then prompts the operator for the Basic Pri test file if he selected the file override option. The DGU is then programmed according to this file. The default file for this is BPRI.DAT. The program starts a simple emitter according to the PRI values in this file. The PRI generation is verified by reading pulse counts. The pulse count reading must be within 25% of the expected value, or the test fails. If trace is enabled, the measured PRI is displayed at the console.

10.2.2.2 Code 2.2 - Density Subtest

Command 2.2 is used to execute the Density Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The density subtest then executes as described below. If looping is enabled, the density subtest executes until an error occurs or until a character is entered at the keyboard.

The Density Subtest begins by prompting the operator for the Density Test filename if he selected the file override option. The default file is DEN2TST.DAT. The program interprets this file and initializes the DGU with 1023 emitters running. Then, each second for the next five seconds the pulse counts are checked for each emitter. Any emitter with a zero pulse count is counted as an error and reported to the operator. The dropped emitter detector is then checked to see if it agrees with the pulse count results. If a dropped emitter is detected, the operator is prompted to connect the Digital Pulse Memory (DPM) to the DGU. The program then loads the DPM with pulses to determine if the emitter is dropped or not. The program will notify the operator if pulses are detected in the DPM or not. The test passes if no dropped emitters are detected.

10.2.3 Code 3 - Pulse Analysis

Command code three is used to execute the Pulse Analysis test. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not.

The test begins by initializing the DGU as determined by the DGU initializing

file. The default file of INI2DGU.DAT may be overridden if the operator selected that option. Next, the test prompts the operator for the threshold file if the override file option is selected, or else the program uses the default of THRTST.DAT. The test reads values of range attenuation and receiver sensitivity from the file, and programs the DGU. Then the program checks that the DGU registers pulse counts only when receiver sensitivity is greater than or equal to range attenuation. If this is not the case, the test notifies the operator and terminates.

10.2.4 Code 4 - Emitter Link Tests

Command code four is used to execute the Emitter Link test. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The five subtests of the test are then executed sequentially. The subtests are as follows:

1 - Sequence Linking
2 - Sequence Link Code Jitter
3 - Sync Linking
4 - Repeat Count Linking
5 - Pattern Overflow Linking

These subtests are described below. If loop on test is enabled, the five subtests are repeated until an error occurs, or until any character is entered at the console.

10.2.4.1 Code 4.1 - Sequence Linking Subtest

Command code 4.1 is used to execute the Sequence Linking Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The Sequence Linking subtest then executes as described below. If looping is enabled, the sequence linking subtest executes until an error occurs, or until any character is entered at the console.

The Sequence Linking Subtest begins by prompting the operator for the DGU

initializing filename if he selected the override option. The default file is INI2DGU.DAT. The program interprets this file and initializes the DGU accordingly. The format of this file is described in Appendix E. The program then prompts the operator for the Sequence Link file if he selected the override option. the DGU is then programmed according to this file. The default file is SEQLNK.DAT. A pulse group is now running in the DGU. The program checks pulse counts of each DGU slot. If the pulse counts are not within 25% of the expected value, an error is generated. Next, the operator is prompted to connect the DPM to the DGU. The DPM then collects 2048 pulse descriptors. The program then reads the collected pulse descriptors from the DPM and checks time spacing between pulses. Note that the pulse width of each pulse identifies the slot sourcing that pulse. The time spacing should be within 1 microsecond of the expected value or else an error is generated. If trace is enabled, the actual and expected pulse spacings are displayed at the console.

10.2.4.2 Code 4.2 - Sequence Link Jitter Subtest

Command code 4.2 is used to execute the Sequence Link Jitter Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default files or not. The Sequence Link Jitter subtest then executes as described below. If looping is enabled, the subtest executes until an error occurs, or until any character is entered at the console.

The Sequence Link Jitter Subtests begins by prompting the operator for the DGU initializing file name if he selected the override option. The default file is INI2DGU.DAT. The program interprets this file and initializes the DGU accordingly. The format of this file is described in Appendix E. The program then prompts the operator for the Sequence Link Jitter file if the override option is selected. The DGU is then programmed according to this file. The default file is SEQJIT.DAT. An emitter is now programmed with PRI jitter with a known set. Pulse counts for each set are checked to be within 25% of an expected value or else an error is generated.

10.2.4.3 Code 4.3 - Sync Link Subtest

Command code 4.3 is used to execute the Sync Link Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The Sync Link subtest then executes as described below. If looping is enabled, the subtest executes until an error occurs, or until any character is entered at the console.

The Sync Link Subtest begins by prompting the operator for the DGU initializing filename if he selected the override option. The default file is INI2DGU.DAT. The program interprets the data file and initializes the DGU accordingly. The format of this file is described in Appendix E. The program then prompts the operator for the Sync Link file if he selected the override option. The DGU programming is then modified according to this file. The default file is SYNLNK.DAT. An emitter with several associated emitters is now running in the DGU. Pulse counts are first checked to insure that they are within 25% of their expected value. Next, the operator is prompted to connect the DGU to the DPM. The DPM collects pulse descriptors that are output by the DGU. Then, the program reads pulse descriptors from the DPM. The pulse width field of the pulse descriptors denote the DGU slot sourcing the pulse. The pulses are checked for the proper sequence and spacing. The time spacing must be within 25% of the expected value or an error results.

10.2.4.4 Code 4.4 - Repeat Count Link Subtest

Command code 4.4 is used to execute the Repeat Count Link Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The Repeat Count Link subtest then executes as described below. If looping is enabled, the subtest executes until an error occurs, or until any character is entered at the console.

The Repeat Count Link Subtest begins by prompting the operator for the DGU initializing filename if he selected the override option. The default file is INI2DGU.DAT. The program interprets the data file and initializes the DGU accordingly. The format of this file is described in Appendix E. The program

then prompts the operator for the Repeat Count filename if he selected the override option. The DGU programming is then modified according to this file. The default file is RPTLNK.DAT. A series of DGU slots are now repeat linked in a chain. Pulse counts are then checked to insure that they are within 25% of the expected value, or else an error occurs. If trace is enabled, the expected and actual pulse counts are displayed on the console.

10.2.4.5 Code 4.5 - Pattern Overflow Linking Subtest

Command code 4.5 is used to execute the Pattern Overflow Linking Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The Pattern Overflow Link subtest then executes as described below. If looping is enabled, the subtest executes until an error occurs, or until any character is entered at the console.

The Pattern Overflow Subtest begins by prompting the operator for the DGU initializing filename if he selected the override option. The default file is INI2DGU.DAT. The program interprets the data file and initializes the DGU accordingly. The format of this file is described in Appendix E. The program then prompts the operator for the Pattern/Switch Link filename if he selected the override option. The default file is PATLNK.DAT. The DGU programming is then modified according to this file. A series of DGU slots are pattern/switch linked into a group at this time. Pulse counts are checked to insure that they are within 25% of the expected value, or else an error occurs. If trace is enabled, the expected and actual pulse counts are displayed at the console.

10.2.5 Code 5 - Data Path Test

Command code five is used to execute the Data Paths Test. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The Data Paths test then executes as described below. If looping is enabled, the test executes until an error occurs, or until any character is entered at the console.

The Data Paths Test begins by prompting the operator for the DGU initializing

filename if he selected the override option. The default file is INI2DGU.DAT. The program interprets the data file and initializes the DGU accordingly. The format of the file is described in Appendix E. The program then prompts the user to connect the DPM to the DGU output. The following DGU fields are checked in this test.

Chirp Rate
RF Channel
FM Noise Enable
Chirp Direction
Pulse Width
User Flags
Fine Pulse Position
Pool Select

The test is accomplished by programming the DGU parameters that affect the above fields, then using the DPM attempts to recreate those parameters. Any comparison error results in test termination with the field number, actual value, and expected value displayed at the console.

10.2.6 Code 6 - PRI Generation Test

Command code six is used to execute the PRI Generation Test. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. Then, the PRI Modulation Subtest followed by the PRI Jitter Subtest execute as described below. If looping is enabled, the subtests are executed one after the other until an error occurs, or until any character is entered at the console.

10.2.6.1 Code 6.1 - PRI Modulation Subtest

Command code 6.1 is used to execute the PRI Modulation Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether to override the default data files or not. The PRI Modulation subtest then executes as described below. If looping is enabled, the PRI Modulation subtest executes until an error occurs, or until any character is entered at the

console.

The PRI Modulation Subtest begins by prompting the operator for the DGU initializing filename if the override option is selected. The default file is INI2DGU.DAT. The program interprets this file and initializes the DGU accordingly. The format of the file is described in appendix E. The program then prompts the operator for the PRI Modulation filename if the override option was selected. The default file is PRIMOD.DAT. The DGU programming is then modified according to this file. An emitter is now running that has a modulated PRI. The operator is then prompted to connect the DPM to the DGU output. The DPM is then loaded with 2048 pulse descriptors from the DGU. By checking the time of arrival between pulse descriptors, the PRI of the emitter is determined. The expected value is compared against the actual value for a difference no greater than 2 microseconds or else an error is generated.

10.2.6.2 Code 6.2 - PRI Jitter Subtest

Command code 6.2 is used to execute the PRI Jitter Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The PRI Jitter subtest then executes as described below. If looping is enabled, the subtest executes until an error occurs, or any character is entered at the console.

The PRI Jitter Subtest begins by prompting the operator for the DGU initializing filename if the file override option is selected. The default file is INI2DGU.DAT. The program interprets this file and initializes the DGU accordingly. The format of this file is described in Appendix E. The program then prompts the operator for the PRI Jitter filename if the override option is selected. The default file is PRIJIT.DAT. The DGU programming is then modified according to this file. The operator is then prompted to connect the DPM to the DGU output. The DPM collects digital pulse descriptors until 2048 are collected. The time of arrival differences between pulse descriptors comprise a set of PRI's. This set is then checked for validity and randomness. If a PRI is greater than the jitter limit, or if the set does not appear to be random, the test fails.

10.2.7 Code 7 - RF Generation Tests

Command code seven is used to execute the RF Generation test. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. Then, the RF Modulation Subtest followed by the RF Agility Subtest execute as described below. If looping is enabled, the subtests execute one after the other until an error occurs, or until any character is entered at the console.

10.2.7.1 Code 7.1 - RF Modulation Subtest

Command code 7.1 is used to execute the RF Modulation Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether to override the default data files or not. The RF Modulation subtest then executes as described below. If looping is enabled, the RF Modulation subtest executes until an error occurs, or until any character is entered at the console.

The RF Modulation subtest begins by prompting the operator for the DGU initializing filename if the override option is selected. The default file is INI2DGU.DAT. The program interprets this file and initializes the DGU accordingly. The format of this file is described in Appendix E. The program then prompts the operator for the RF Modulation filename if the override option is selected. The default file is RFMOD.DAT. The DGU programming is then modified according to this file. An emitter is now running that has a modulated RF. The operator is then prompted to connect the DPM to the DGU output. The DPM is then loaded with 2048 pulse descriptors from the DGU. The RF fields of the pulse descriptors are checked with an expected value. A difference of greater than .25 MHz is considered an error. If trace is enabled, the expected and actual values are displayed at the console.

10.2.7.2 Code 7.2 - RF Agility Subtest

Command code 7.2 is used to execute the RF Agility Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether to override the default data files or not. The RF Agility subtest then executes

as described below. If looping is enabled, the RF Agility subtest executes until an error occurs, or until any character is entered at the console.

The RF Agility Subtest begins by prompting the operator for the DGU initializing filename if the override option is selected. The default file is INI2DGU.DAT. The program interprets this data file and initializes the DGU accordingly. The format for this file is described in Appendix E. The program then prompts the operator for the RF Agility file name if the override option was selected. The default file is RFJIT.DAT. The DGU programming is modified according to this file. An emitter is now running that has RF agility. The operator is then prompted to connect the DPM to the DGU output. The DPM then collects 2048 pulse descriptors. The RF field is checked for agility limits and randomness. If the agility exceeds the limits, or does not appear to be random, the test fails.

10.2.8 Code 8 - Azimuth Scan Test

Command code eight is used to execute the Azimuth Scan Test. The operator is first asked if he desires to loop on the test, or execute it once, and whether to override the default data files or not. The subtests, which described below, are executed in sequential order. If looping is enabled, the test executes until an error occurs, or until any character is entered at the console.

10.2.8.1 Code 8.1 - Azimuth Scan Rate Subtest

Command code 8.1 is used to execute the Azimuth Scan Rate Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The Azimuth Scan Rate Subtest then executes as described below. If looping is enabled, the subtest executes until an error occurs, or until any character is entered at the console.

The Azimuth Scan Rate subtest begins by prompting the operator for the DGU initializing filename if the override option is selected. The default file is INI2DGU.DAT. The program interprets this file and initializes the DGU accordingly. The format of the file is described in Appendix E. The program then prompts the operator for the Azimuth Scan Rate file if the override option

is selected. The default file is AZ1TST.DAT. The DGU programming is then modified according to this file. A scanning emitter is now running in the DGU. The operator is then prompted to connect the DPM to the DGU output. The DPM is then loaded with 2048 pulse descriptors from the DGU. The DPM is then read to find the time between peaks in transmitted amplitude to find scan rate. The derived scan rate must be within 25% of the expected value or else an error is detected.

10.2.8.2 Code 8.2 - Azimuth Sector Width Subtest

Command code 8.2 is used to execute the Azimuth Sector Width Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The Azimuth Sector Width subtest then executes as described below. If looping is enabled, the subtest executes until an error occurs, or until any character is entered at the console.

The Azimuth Sector Width Subtest begins by prompting the operator for the DGU initializing filename if the override option is selected. The default file is INI2DGU.DAT. The program interprets this file and initializes the DGU accordingly. The format of this file is described in Appendix E. the program t ıen prompts the operator for the Azimuth Sector Width data file if the override option is selected. The default file is AZ2TST.DAT. The DGU programming is then modified according to this file. A scanning emitter is now running in the DGU. The operator is then prompted to connect the DPM to the DGU output. The DPM is then loaded with 2048 pulse descriptors from the DGU. The DPM is then read to determine the time between peaks in amplitude of the transmitted pulses. Scan rate is assumed to be a constant value. The derived sector width must be within 25% of the expected value or else an error is reported.

10.2.8.3 Code 8.3 - Azimuth Beamwidth Subtest

Command code 8.3 is used to execute the Azimuth Beamwidth Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The Azimuth Beamwidth Subtest executes as described below. If looping is enabled, the

subtest executes until an error occurs, or until any character is entered at the console.

The Azimuth Beamwidth Subtest begins by prompting the operator for the DGU initializing filename if the override option is selected. The default file is INI2DGU.DAT. The program interprets this file and initializes the DGU accordingly. The format of this file is described in Appendix E. The program then prompts the operator for the Azimuth Beamwidth data file if the override option is selected. The default file is AZ3TST.DAT. The DGU programming is then modified according to this file. A scanning emitter is now running in the DGU. The operator is then prompted to connect the DPM to the DGU output. The DPM then collects 2048 digital pulse descriptors from the DGU. These pulse descriptors are then read from the DPM to calculate an apparent azimuth beamwidth. Since the scan rate is a known value, the beamwidth is derived by finding the time between an amplitude peak and the 3 db down point. The actual time must be within 25% of the expected value or else an error is generated.

10.2.8.4 Code 8.4 - Azimuth Antenna Pattern Subtest

Command code 8.4 is used to execute the Azimuth Antenna Pattern Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The Azimuth Antenna Pattern subtest then executes as described below.

The Azimuth Antenna Pattern Subtest begins by prompting the DGU initializing files if the override option is selected. The default file is INI2DGU.DAT. The program interprets this file and initializes the DGU accordingly. The format of this file is described in Appendix E. The program then prompts the operator for the Azimuth Antenna Pattern file if the override option is selected. The default file is AZ4TST.DAT. The DGU programming is modified according to this data file. A scanning emitter is now running in the DGU. The operator is then prompted to connect the DPM to the DGU output. The DPM then collects 2048 pulse descriptors output by the DGU. The pulse amplitudes are compared against a known set stored in another data file. If the actual and expected values do not agree, an error occurs.

10.2.9 Code 9 - Elevation Scan Test

Command code nine is used to execute the Elevation Scan Test. The operator is first asked if he desires to loop on the test, or execute it once, and whether to override the default data files or not. The subtests, which described below, are executed in sequential order. If looping is enabled, the test executes until an error occurs, or until any character is entered at the console.

10.2.9.1 Code 9.1 - Elevation Scan Rate Subtest

Command code 9.1 is used to execute the Elevation Scan Rate Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The Elevation Scan Rate Subtest then executes as described below. If looping is enabled, the subtest executes until an error occurs, or until any character is entered at the console.

The Elevation Scan Rate subtest begins by prompting the operator for the DGU initializing filename if the override option is selected. The default file is INI2DGU.DAT. The program interprets this file and initializes the DGU accordingly. The format of the file is described in Appendix E. The program then prompts the operator for the Elevation Scan Rate file if the override option is selected. The default file is EL1TST.DAT. The DGU programming is then modified according to this file. A scanning emitter is now running in the DGU. The operator is then prompted to connect the DPM to the DGU output. The DPM is then loaded with 2048 pulse descriptors from the DGU. The DPM is then read to find the time between peaks in transmitted amplitude to find scan rate. The derived scan rate must be within 25% of the expected value or else an error is detected.

10.2.9.2 Code 9.2 - Elevation Sector Width Subtest

Command code 9.2 is used to execute the Elevation Sector Width Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The Elevation Sector Width subtest then executes as described below. If looping is enabled,

the subtest executes until an error occurs, or until any character is entered at the console.

The Elevation Sector Width Subtest begins by prompting the operator for the DGU initializing filename if the override option is selected. The default file is INI2DGU.DAT. The program interprets this file and initializes the DGU accordingly. The format of this file is described in Appendix E. the program then prompts the operator for the Elevation Sector Width data file if the override option is selected. The default file is EL2TST.DAT. The DGU programming is then modified according to this file. A scanning emitter is now running in the DGU. The operator is then prompted to connect the DPM to the DGU output. The DPM is then loaded with 2048 pulse descriptors from the DGU. The DPM is then read to determine the time between peaks in amplitude of the transmitted pulses. Scan rate is assumed to be a constant value. The derived sector width must be within 25% of the expected value or else an error is reported.

10.2.9.3 Code 9.3 - Elevation Beamwidth Subtest

Command code 9.3 is used to execute the Elevation Beamwidth Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The Elevation Beamwidth Subtest executes as described below. If looping is enabled, the subtest executes until an error occurs, or until any character is entered at the console.

The Elevation Beamwidth Subtest begins by prompting the operator for the DGU initializing filename if the override option is selected. The default file is INI2DGU.DAT. The program interprets this file and initializes the DGU accordingly. The format of this file is described in Appendix E. The program then prompts the operator for the Elevation Beamwidth data file if the override option is selected. The default file is EL3TST.DAT. The DGU programming is then modified according to this file. A scanning emitter is now running in the DGU. The operator is then prompted to connect the DPM to the DGU output. The DPM then collects 2048 digital pulse descriptors from the DGU. These pulse descriptors are then read from the DPM to calculate an apparent Elevation

beamwidth. Since the scan rate is a known value, the beamwidth is derived by finding the time between an amplitude peak and the 3 db down point. The actual time must be within 25% of the expected value or else an error is generated.

10.2.9.4 Code 9.4 - Elevation Antenna Pattern Subtest

Command code 9.4 is used to execute the Elevation Antenna Pattern Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The Elevation Antenna Pattern subtest then executes as described below.

The Elevation Antenna Pattern Subtest begins by prompting the DGU initializing files if the override option is selected. The default file is INI2DGU.DAT. The program interprets this file and initializes the DGU accordingly. The format of this file is described in Appendix E. The program then prompts the operator for the Elevation Antenna Pattern file if the override option is selected. The default file is EL4TST.DAT. The DGU programming is modified according to this data file. A scanning emitter is now running in the DGU. The operator is then prompted to connect the DPM to the DGU output. The DPM then collects 2048 pulse descriptors output by the DGU. The pulse amplitudes are compared against a known set stored in another data file. If the actual and expected values do not agree, an error occurs.

10.2.10 Code 10 - Receiver Scan Test

Command code ten is used to execute the Receiver Scan test. The operator is first asked if he wishes to loop on the test, or execute it once, and whether he desires to override the default data files. The Receiver Scan Test then executes as described below. If looping is enabled, then the test runs until an error is detected, or until any character is entered at the console.

The Receiver Scan Test begins by prompting the operator for the DGU initializing file is the override option is selected. The default file is INI2DGU.DAT. The program interprets this file and initializes the DGU accordingly. The format for this file is described in Appendix E. The operator is then prompted for the receiver amplitude modulation word he wishes to check. The legal values are

1,2,3. The AMODR to be checked must have the test proms installed. Next, the program prompts the operator to connect the DPM to the DGU output.

An emitter is now running in the DGU. The emitter is moved through 360 degrees of AOA with respect to the observer. At each BAM increment, the DPM is used to monitor pulse descriptors output by the DGU. The AMODR extracted from a pulse descriptor must be equal to the least significant six bits of the AOA or else an error is generated. If trace is enabled, the expected and actual AMODR's are displayed at the console before they are compared.

10.2.11 Code 11 - RF Management Test

Command code eleven is used to execute the RF Management Test. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files. The operator is then asked to enter which RF management channel to test or 0 for all. The RF Management Data Paths Subtest, followed by the RF Management Pooling Subtest, are executed as described below. If looping is enabled, the subtests are executed alternately until an error is detected, or until any character is entered at the console.

10.2.11.1 Code 11.1 - RF Management Data Paths Subtest

Command Code 11.1 is used to execute the RF Management Data Paths Subtest. The Operator is first asked if he wishes to loop on the test, or execute it once, and whether he desires to override the default data files. The operator is then asked to enter which RF Management Channel to test or 0 for all. The subtest then executes as described below. If looping is enabled, the subtest executes until a error is detected, or until any character is entered at the console.

The RF Management Data Paths Subtest begins by prompting the operator for the DGU initializing filename if the override option is selected. The default file is INI2DGU.DAT. The program interprets this file and initializes the DGU accordingly. The format of this file is described in Appendix E. The operator is then asked the AMODR is to be tested. The legal values are 1,2, or 3. The AMODR being tested must be supplied with test proms. Next, the operator is prompted to connect the DPM to the RF management channel being tested. Using

the DPM, the following RF management signals are checked.

RFDA AMODR
RFDA Frequency
RFDA Antenna Select
Synthesizer Frequency
Synthesizer AMODR
FM Noise Enable

The signals are tested with several different patterns and any comparison error is displayed at the console. The test is terminated at the first error encountered.

10.2.11.2 Code 11.2 - RF Management Pooling Subtest

Command code 11.2 is used to execute the RF Management Pooling Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default data files or not. The operator is then asked to enter which RF management channel to test, or 0 for all. The subtest then executes as described below. If looping is enabled, the subtest executes until an error is detected, or until any character is entered at the console.

The RF Management Pooling Subtest begins by prompting the operator for the DGU initializing filename if the override option is selected. The default file is INI2DGU.DAT. The format of the file is described in Appendix E. Next, the operator is prompted to connect the DPM to the RF management channel under test. The DPM is then used to monitor activity on the RF management channel under the following conditions.

1. Pulses sent through channel when it is pooled.
2. Pulses not sent through channel when it is not pooled, and not direct assigned.
3. Pulses sent through channel when it is not pooled, but is direct assigned.

If the above conditions are not observed, an error is generated, and the operator is notified at the console of the reason.

10.2.12 Code 12 - Frequency Synthesizer Test

Command code twelve is used to execute the Frequency Synthesizer test. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default test point files. The program then prompts the operator to specify which synthesizer channel is to be tested, or zero to test all channels. The operator then specifies which frequency band (Appendix F) is to be tested, or zero to test all frequencies. The Frequency Accuracy and Output Power subtests are then executed as described below. If looping is enabled, the accuracy and power subtests are alternately executed until any character is input on the keyboard.

10.2.12.1 Code 12.1 - Frequency Accuracy Subtest

Command code 12.1 is used to execute the Frequency Accuracy Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default test point files. The program then prompts the operator to specify which synthesizer channel is to be tested, or zero to test all channels. The operator then specifies which frequency band (Appendix F) is to be tested, or zero to test all frequencies. The Frequency Accuracy subtest is then exeuted as described below. If looping is enabled, the accuracy subtest is executed until any character is input on the keyboard.

The Frequency Accuracy Subtest begins by reading the test points from an ASCII text file. If an override of the default has been requested, the operator is prompted to enter the name of the file containing the frequency values to be tested. If no override is requested, the default name of T121.FRQ is used. A maximum of 1000 frequencies are read from the test point file. For the synthesizer channel selected, or for all channels, the program tests all frequencies which lie within the frequency bands to be tested. For each frequency, the test verifies that the measured value is within .25 MHz of the specified value, and that the output power is at least -25 dBm. An error message is generated for each frequency which fails either test. If trace is

enabled, and no error is detected for a particular frequency, the measured frequency and power level are displayed for that test point. As each frequency band or synthesizer channel is completed, the operator is prompted to connect the spectrum analyzer to the next test point.

10.2.12.2 Code 12.2 - Output Power Subtest

Command code 12.2 is used to execute the Output Power Subtest. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default test point files. The program then prompts the operator to specify which synthesizer channel is to be tested, or zero to test all channels. The operator then specifies which frequency band (Appendix F) is to be tested, or zero to test all frequencies. The Output Power subtest is then executed as described below. If looping is enabled, the power subtest is executed until any character is input on the keyboard.

The Output Power Subtest begins by reading the test points from two ASCII files. If an override of the default has been requested, the operator is prompted to enter the name of the file containing the frequency test points and the name of the file containing the attenuator test points. Otherwise, default names of T122.FRQ for frequency points and T122.ATN for attenuation points are used. A maximum of 1000 frequencies and 64 attenuations are read from the test point files. For the synthesizer channel selected, or for all channels, the program tests all frequencies which lie within the frequency bands to be tested. For each frequency, the program verifies that the maximum output power, at zero attenuation, lies between -3dBm and +3dBm. The program then checks each attenuation value relative to the measured maximum power. An error message is generated for each frequency and attenuation combination which fails. If trace is enabled, and no error is detected for a particular test point, the programmed attenuation and meaured output power are displayed. As each frequency band or synthesizer channel is completed, the operator is prompted to connect the spectrum analyzer to the next test point.

10.2.13 Code 13 - Pulse Modulation Test

Command code thirteen is used to execute the Pulse Modulation test. The

operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default test point files. The program then prompts the operator to specify which synthesizer channel is to be tested, or zero to test all channels. The operator then specifies which frequency band (Appendix F) is to be tested, or zero to test all frequencies. The Pulse Modulation test is then executed as described below. If looping is enabled, the test is executed until any character is input on the keyboard.

The Pulse Modulation begins by reading the test points from an ASCII file. If an override of the default has been requested, the operator is prompted to enter the name of the file containing the frequency test points. Otherwise, the default name of T13.FRQ is used. A maximum of 100 frequencies is read fom the test point file. For the synthesizer channel selected, or for all channels, the program tests all frequencies which lie within the frequency bands to be tested. For each frequency, the program tests pulse width values of .1, .2, .4, .8, 1.6, 3.2, 6.4 and 12.8 usec. An error message is generated for each frequency and pulse width combination which fails. If trace is enabled, and no error is detected for a particular test point, the programmed and measured pulse widths are displayed. As each frequency band or synthesizer channel is completed, the operator is prompted to connect the spectrum analyzer to the next test point.

10.2.14 Code 14 - Chirp Test

Command code fourteen is used to execute the Chirp test. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default test point files. The program then prompts the operator to specify which synthesizer channel is to be tested, or zero to test all channels. The operator then specifies which frequency band (Appendix F) is to be tested, or zero to test all frequencies. The Chirp Down and Chirp Up subtests are then executed as described below. If looping is enabled, the Chirp Down and Chirp Up subtests are executed until any character is input on the keyboard.

The chirp test begins by reading the test points from an ASCII file. If an override of the default has been requested, the operator is prompted to enter the name of the file containing the frequency test points and the name of the

file containing the chirp test points. Otherwise, default names of T14.FRQ for frequency points and T14.CHP for chirp values are used. A maximum of 100 frequencies and 100 chirp values are read from the test point files. For the synthesizer channel selected, or for all channels, the program tests all frequencies which lie within the frequency bands to be tested. For each frequency, the program first tests each chirp value in the chirp down mode and then tests each chirp value in the chirp up mode. An error message is generated for each frequency and chirp combination which fails. If trace is enabled, and no error is detected for a particular test point, the programmed and measured chirp value is displayed. As each frequency band or synthesizer channel is completed, the operator is prompted to connect the spectrum analyzer to the next test point.

10.2.15 Code 15 - Frequency Distribution Test

Command code fifteen is used to execute the Frequency Distribution test. The operator is first asked if he desires to loop on the test, or execute it once, and whether he wishes to override the default test point files. The program then prompts the operator to specify which DOA port is to be tested, or zero to test all ports. The Frequency Distribution test is then executed as described below. If looping is enabled, the accuracy and power subtests are alternately executed until any character is input on the keyboard.

The Frequency Distribution test begins by reading the test points from an ASCII file. If an override of the default has been requested, the operator is prompted to enter the name of the file containing the frequency test points. Otherwise, default names of T15.FRQ is used. A maximum of 100 frequencies is read from the test point file. For the DOA port selected or for all ports the program tests each frequency. The output power is measured with DOA set to the center of the sector for the port being tested. The DOA is then varied in one angle unit increments using a test receiver pattern number. The output power must vary by 1 dB for each angle unit of movement from center. An error message is generated for each frequency and DOA combination which fails. If trace is enabled, and no error is detected for a particular test point, the programmed DOA and measured output power are displayed.

10.2.16 Code 16 - Enable Trace

Command code sixteen is used to enable the trace option. The trace option causes informative output to be displayed at the operator's console. The trace option remains selected until it is explicitly disabled by command code seventeen.

10.2.17 Code 17 - Disable Trace

Command code seventeen is used to disable further trace output from being displayed at the operator's console. See command code sixteen for further information.

10.2.18 Code 97 - List DGU Test Menu

Command code ninty-seven is used to cause the DGU Test Menu to be displayed at the operator's console. Tests that are used for DGU testing are given in this menu.

10.2.19 Code 98 - List RF Test Menu

Command code ninty-eight is used to cause the RF Test Menu to be displayed at the operator's console. Tests that are used for RF Management, RF Distribution, and Frequency Synthesizer are given in this menu.

10.2.20 Code 99 - Exit

Command code 99 is used to exit the fault testing program. Control is returned to the ATEWES Executive or to the RSX-11M Executive depending on how fault testing was started.

SECTION 11

MANUAL DGU PROGRAMMING - SEND

The Manual DGU Programming program allows the operator to send single commands from the control computer to the Digital Generator. This program is helpful for testing hardware communication between the Control Computer and the Digital Generator. The program is initiated by selecting Manual DGU Programming from the System Maintenance Functions submenu of the ATEWES Executive Menu, or by entering a RUN SEND command on the operator's console. The operator is prompted to enter a single command and data field, in octal, which is formatted and output to the Digital Generator. The response word read back from the Digital Generator is formatted and output in octal. The operator is then prompted to enter the next command. Appendix E of the Realtime Program Product Specification describes the format of all Digital Generator commands. A control Z is used to exit the program. Control is returned either to the ATEWES Executive Menu or to the RSX-11M Executive.

SECTION 12

RAW EMITTER DATA DUMP PROGRAM - DUMP

The Raw Emitter Data Dump program allows the operator to obtain a dump of the emitter parameter memory Digital Generator for a specified set of emitter slots. This program is helpful for verifying actual emitter parameters as output to the Digital Generator. The program is initiated by selecting Raw Emitter Data Dump from the System Maintenance Functions submenu of the ATEWES Executive Menu, or by entering a RUN DUMP command on the operator's console. The operator selects output on either the CRT or the printer, and selects the range of emitter slots to be dumped. For each Digital Generator Slot selected, all parameter memory is read and displayed. Each ten bit parameter memory location value is identified by its command code and a brief ASCII description. The program is terminated by a carriage return for the output destination. Control is returned to the ATEWES Executive Menu or to the RSX-11M Executive.

APPENDIX A

REFERENCE TABLES

A.1 TABLE I - SCENARIO EVENT TYPES

EVENT	TYPE	WORDS/EVENT	EVENTS BLOCK
1	ENTER/UPDATE PLATFORM	25	10
2	DELETE PLATFORM	4	64
3	ENTER/UPDATE EMITTER	41*	6
4	DELETE EMITTER	4	64
5	EMITTER OFF	4	64
6	EMITTER ON	4	64

*Length of simple emitter, each additional field adds one word.

A.2 TABLE II - PLATFORM ENTRY PARAMETERS

PARAMETER		RANGE	UNITS
Event Type			
0 - New			
1 - Reposition			
2 - Velocity Change			
3 - Turn			
Platform Number	(All)	0 - 255	
East-west position	(New, Reposition)	-2000 - +2000	Kilometers
North-south position	(New, Reposition)	-2000 - +2000	Kilometers
Altitude	(New, Reposition)	0 - +1000	Kilometers
Heading	(All)	-360 - +360	Degrees
Velocity	(New, Velocity Change, Turn)	0 - +5000	KM/Hr
Climb Rate	(New, Velocity Change)	-511 - +511	Meters/Sec.
Turn Angle	(Turn)	-360 - +360	Degrees
Turn Time	(Turn)	0,0 - +546,07	Min,Sec
Platform ID	(New)		

A.3 TABLE III - EMITTER ENTRY PARAMETERS

PARAMETERS, UNITS		RANGE
Emitter Identification		0 - 255
Platform Number		1 - 1023
Emitter Number		
Emitter Type		
1 - New		
2 - Mode Change		
3 - Dependent Signal		
4 - Mode Change Dependent Signal		
Emitter Radiating Status (0/1)		
Frequency Type		
1 - Continuous Wave (CW)		
2 - Single Frequency		
3 - Sequence		
4 - Periodic Modulation		
5 - Switching		
6 - Discrete Agility		
7 - Multibeam		
8 - Associated		
Known Frequency Set (0/1)	(Discrete Agility)	
PRI/Modulation Sync (0/1)	(Periodic)	
Time/Pulse Pattern (0/1)	(Periodic)	
Number of Segments (2-10)	(Switching)	
Number of Segments (1-10)	(Periodic)	
Number of Beams (2-4)	(Multibeam)	
Number of Pulses in Sequence (2-100)	(Sequence)	
Number of Frequency Values in Set (2-100)	(Discrete Agility)	
Frequency Master Emitter	(Associated)	1 - 1023
Frequency (MHZ)		500 - 19455
Periodic Pattern Type (0-15)	(Periodic, Associated)	
Modulation Period (Sec)	(Periodic)	.002 - 60

PARAMETERS, UNITS		RANGE
Modulation Amplitude (MHZ)	(Periodic, Associated)	0 - 1019
Dwell Time (Sec)	(Switcher)	0 - 60
Dwell Variation (Sec)	(Switcher)	0 - 60
Additional Frequencies (MHZ)	(Periodic,Switching) (Known Discret Agility) (Sequence) (Multibeam)	500 - 19455
Additional Pattern Types (0-15)	(Periodic)	
Additional Modulation Periods (sec)	(Periodic)	.002 - 60
Additional Modulation Amplitudes (MHZ)	(Periodic)	0 - 1019
Additional Dwell Times (Sec)	(Switcher)	0 - 60
Additional Dwell Variations (Sec)	(Switcher)	0 - 30
Beam Offsets 9NSEC)	(Multibeam)	50 - 1950
Discrete Agility Limit (MHZ)	(Unknown Discrete Agility	0 - 1000
Continuous Agility Limit (MHZ)	(Unless CW) or Discrete Agility)	0 - 1000
Chirp Limit (MHZ)	(Unless CW)	-250 - +250
PRI Type		
1 - Single PRI		
2 - Stagger, Pulse Group, Sequence		
3 - Periodic Modulation		
4 - Switching		
5 - Discrete Jitter		
Known PRI Set (0/1)	(Discrete Jitter)	
PRI/Modulation Sync (0/1)	(Periodic)	
Time/Pulse Pattern (0/1)	(Periodic)	
Individual Pulse Widths (0/1)	(Sequence) (Periodic, Switching)	
Number of Segments (2-10)	(Switching)	

PARAMETERS, UNITS		RANGE
Number of Segments (1-10)	(Periodic)	
Number of Pulses in Sequence (2-100)	(Sequence)	
Number of PRI Values in Set (2-100)	(Discrete Jitter	
Individual Associated Emitters (0/1)	(Sequence, Switching)	0 - 32767
PRI (USEC)		
Periodic Pattern Type (0-15)	(Periodic)	.002 - 60
Modulation Amplitude (USEC)	(Periodic)	0 - 1019
Dwell Time (SEC)	(Switcher)	0 - 30
Pulse Width (USEC)		.1 - 102.3
Associated Emitter Number	(Unless Multibeam, Periodic or Discrete Jitter)	1 - 1023
Additional PRI Values (USEC)	(Periodic,Switching) (Switching) (Known Discrete Jitter)	0 - 32767
Additional Pattern Types (0-15)	(Periodic)	
Additional Modulation Periods (sec)	(Periodic)	.002 - 60
Additional Modulation Amplitudes (MHZ)	(Periodic)	0 - 1019
Additional Dwell Times (Sec)	(Switcher)	0 - 60
Additional Dwell Variations (Sec)	(Switcher)	0 - 30
Additional Pulse Widths (USEC)	(Individual Pulse Widths)	.1 - 102.3

PARAMETERS, UNITS		RANGE
Additional Associated Emitter Number	(Individual Assoc. Emitters)	- 1023
Discrete Jitter Limit (USEC)	(Unknown Discrete Jitter)	0 - 2047
Continuous Jitter Limit (USEC)	(Unless Discrete Jitter)	- 2047
Effective Radiated Power (dBm)		- 255
Additional Effective Radiated Powers (dBm)	(Multibeam)	- 255
Azimuth Scan Type		
1 - Circular		
2 - Sector		
3 - Raster	(Unless Multibeam)	
4 - Conical	(Unless Multibeam)	
5 - Helical	(Unless Multibeam)	
6 - Steady		
7 - Azimuth ONMI		
8 - Associated Scan		
Azimuth Scan Master Emitter	(Associated)	1 - 1023
Azimuth Beamwidth or Special Pattern (DEG)	(Unless Azimuth OMNI)	-5 - -1, 360/1024-180
Azimuth Scan Period (SEC)	(Sector, Conical, Circular) (Raster, Helical)	0 - 60
Scan Depth (dBm)	(Conical)	4 - 19
Azimuth Track Platform	(Sector, Conical, Steady, (Associated)	-2 - +255
Azimuth Start Angle (DEG)	(Sector, Raster, Conical, Steady, Associated and No Track)	-360 - +360
Azimuth PRI/Scan Period Sync	(Sector, Conical)	
Azimuth UNI/BI Directional	(Sector, Conical, Associated)	
Azimuth Scan Return Blank	(Secto., Conical, Associated and BI)	
Azimuth Sector Width (DEG)	(Sector, Raster, Conical)	0 - +360

PARAMETERS, UNITS		RANGE
Number of Levels/Bars	(Raster, Helical)	2 - +100
Elevation Scan Period Sync	(Sector)	
Elevation Scan Type	(Unless Conical, Raster, Helical, Multibeam)	
1 - Sector		
2 - Steady		
3 - Elevation OMNI		
4 - Associated Scan		
Elevation Scan Master Emitter	(Associated)	1 - 1023
Elevation Beamwidth or Special Pattern (DEG)	(Unless Elevation OMNI or Conical)	-5 - -1, 360/2024 - 180
Elevation Scan Period (SEC)	(Sector, Conical)	0 - 60
Elevation Track Platform	(Sector, Steady, Associated)	-2 - +255
Elevation Start Angle (DEG)	(Sector, Steady, Associated) and No Track Raster, Helical, Multibeam)	-90 - +90
Additional Elevation Start Angles (DEG)	(Multibeam)	-90 - +90
Elevation PRI/Scan Period Sync	(Sector)	
Elevation UNI/BI Directional	(Sector, Associated)	
Elevation Scan Return Blank	(Sector, Associated and BI)	
Elevation Sector Width (DEG)	(Sector, Raster, Helical)	.352 - 180
Azimuth Scan Period Sync	(Sector)	
Scan Display Status		
0 - Disabled		
1 - Scan Sync Enabled		
2 - PRI Sync Enabled		
3 - Both		
Priority Flag		
Missing Pulse factor (%)		0 - 100
Bearing Jitter (DEG)		0 - 45

PARAMETERS, UNITS		RANGE
Elevation Jitter (DEG)		0 - 45
Direct Assign Synthesizer Channel Number	(Required for CW)	0 - 8
Dedicated Synthesizer Channel (0/1)	(Direct Assign)	
FM Enable 1 for SPS Video, 2 for TTWS Video, 3 for Both		
	(Unless Associated Emitter Selected)	
SPS Video Pulse Offset (NSEC)	(SPS Video Only)(Default -100 NSEC)	(-950) - 950
SPS Video Pulse Width (USEC)	(SPS Video Only)(Default PW+200 NSEC)	.1 - 102.3
TTWS Video Pulse Offset (NSEC)	(TTWS Video Only) (Default -100 NSEC)	(-950) - 950
TTWS Video Pulse Width (USEC)	(TTWS Video Only) (Default PW+200 NSEC)	.1 - 102.3
User Flag 1	(Unless SPS Video)	
User Flag 2	(Unless TTWS Video)	
User Flag 3		

A.4 TABLE IV - MODULATION PATTERN TYPES

PATTERN TYPE	
0 RISING RAMP [RAMP+]	8 FALLING RAMP [RAMP-]
1 RISING CONVEX EXPONENTIAL [EXP V+]	9 FALLING CONVEX EXPONENTIAL [EXP V+]
2 FALLING CONCAVE EXPONENTIAL [EXP C-]	10 RISING CONCAVE EXPONENTIAL [EXP C+]
3 SPARE	11 SPARE
4 SPARE	12 SPARE
5 SPARE	13 SPARE
6 TRAPEZIOD [TRAPZD]	14 TRAPEZIOD [TRAPZD]
7 SINE WAVE [SINE]	15 SINE WAVE [SINE]

A.5 TABLE V - CHIRP LIMIT

Band	Frequency Programmed (MHz)	FM Periodic or Noise Nominal Sensitivity (MHz/Volt)
0	500-1023.875	-312.5
1	1024-2047.875	-250.0
2	2048-3071.875	-187.5
3	3072-4095.875	+187.5
4	4096-5119.875	+250.0
5	5120-6143.875	+312.5
6	6144-7167.875	-187.5
7	7168-8191.875	-187.5
8	8192-9215.875	-312.5
9	9216-10239.875	-250.0
10	10240-11263.875	-187.5
11	11264-12287.875	+187.5
12	12288-13311.875	+250.0
13	13312-14335.875	+312.5
14	14336-15359.875	+312.5
15	15360-16383.875	+312.5
16	16384-17407.875	+187.5
17	17408-18431.875	+250.0
18	18432-19455.875	+312.5

A.6 TABLE VI - HEADER PAGE PARAMETERS

0) Event Time

1) Emitter Identification

2) Platform Number — 0 - 255

3) Emitter Number

4) Emitter Type

- 1 - New
- 2 - Mode Change
- 3 - Dependent Signal
- 4 - Mode Change Dependent Signal

5) Emitter Radiating Status (0/1)

A.7 TABLE VII - FREQUENCY PAGE PARAMETERS

1)	Frequency type 1 - Continuous Wave (CW) 2 - Single Frequency 3 - Sequence 4 - Periodic Modulation 5 - Switching 6 - Discrete Agility 7 - Multibeam 8 - Associated	(Unless Associated)	
2)	Known Frequency Set (0/1)	(Discrete Agility)	
3)	PRI/Modulation Sync (0/1)	(Periodic)	
4)	Time/Pulse Pattern (0/1)	(Periodic)	
5)	Number of Segments (2-10)	(Switching)	
5)	Number of Segments (1-10)	(Periodic)	
5)	Number of Beams (2-4)	(Multibeam)	
5)	Number of Pulses in Sequence (2-100)	(Sequence)	
5)	Number of Frequency Values in Set (2-100)	(Discrete Agility)	
6)	Frequency Master Emitter	(Associated)	1 - 1023
7)	Frequency (MHZ)		500 - 19455
8)	Periodic Pattern Type (0-15)	(Periodic, Associated)	
9)	Modulation Period (Set)	(Periodic)	.002 - 60
10)	Modulation Amplitude (MHZ)	(Periodic, Associated)	0 - 1019
11)	Dwell Time (Sec)	(Switcher)	0 - 60
12)	Dwell Variation (Sec)	(Switcher)	0 - 30
7.NN)	Additional Frequencies (MHZ)	(Periodic, Switching) (Known Discrete Agility) (Sequence) (Multibeam)	500 - 19455
8.NN)	Additional Pattern Types (0-15)	(Periodic)	

9.NN)	Additional Modulation Periods (SEC)	(Periodic)	.002 - 60
10.NN)	Additional Modulation Amplitudes (MHZ)	(Periodic)	0 - 1019
11.NN)	Additional Dwell Times (SEC)	(Switcher)	0 - 60
12.NN)	Additional Dwell Variations (SEC)	(Switcher)	0 - 30
13.NN)	Beam Offsets (NSEC)	(Multibeam)	50 - 11950
14)	Discrete Agility Limit (MHZ)	(Unknown Discrete Agility)	0 - 11000
14)	Continuous Agility Limit (MHZ)	(Unless CW or Discrete Agility)	0 - 11000
15)	Chirp Limit (MHZ)	(Unless CW)	-255 - +255

A.8 TABLE VIII - PRI PAGE PARAMETERS

1)	PRI Type 1 - Single PRI 2 - Stagger, Pulse Group, Sequence 3 - Periodic Modulation 4 - Switching 5 - Discrete Jitter		
2)	Known PRI Set (0/1)	(Discrete Jitter)	
3)	PRI/Modulation Sync (0/1)	(Periodic)	
4)	Time/Pulse Pattern (0/1)	(Periodic)	
5)	Individual Pulse Widths (0/1)	(Periodic, Switching)	
6)	Number of Segments (2-10)	(Switching)	
6)	Number of Segments (1-10)	(Periodic)	
6)	Number of Pulses in Sequence (2-100)	(Sequence)	
6)	Number of PRI Values in Set (2-100)	(Discrete Jitter)	
7)	Individual Associated Emitters (0/1)	(Sequence, Switching)	
8)	PRI (USEC)		0 - 32767
9)	Periodic Pattern Type (0-15)	(Periodic)	
10)	Modulation Period (SEC)	(Periodic)	.002 - 60
11)	Modulation Amplitude (USEC)	(Periodic)	0 - 1019
12)	Dwell Time (SEC)	(Switcher)	0 - 60
13)	Dwell Variation (SEC)	(Switcher)	0 - 30
14)	Pulse Width (USEC)		.1 - 102.3
15)	Associated Emitter Number	(Unless Multibeam, Periodic or Discrete Jitter)	1 - 1023
8.NN)	Additional PRI Values (USEC)	(Periodic, Switching) (Switching) (Known Discrete Jitter)	0 - 32767
9.NN)	Additional Pattern Types (0-15)	(Periodic)	

10.NN)	Additional Modulation Periods (SEC)	(Periodic)	.002 - 60
11.NN)	Additional Modulation Amplitudes (USEC)	(Periodic)	0 - 1019
12.NN)	Additional Dwell Times (SEC)	(Switcher)	0 - 60
13.NN)	Additional Dwell Variations (SEC)	(Switcher)	0 - 30
14.NN)	Additional Pulse Widths (USEC)	(Individual Pulse Widths)	.1 - 102.3
15.NN)	Additional Associated Emitter Number	(Individual Assoc. Emitters)	1 - 1023
16)	Discrete Jitter Limit (USEC)	(Unknown Discrete Jitter)	0 - 2047
16)	Continuous Jitter Limit	(Unless Discrete Jitter)	0 - 2047

A.9 TABLE IX - SCAN PAGE PARAMETERS

1)	Effective Radiated Power (dBm)		0 - 255
1.NN)	Additional Effective Radiated Powers (dBM)	(Multibeam)	0 - 255
2)	Azimuth Scan Type		
	1 - Circular		
	2 - Sector		
	3 - Raster	(Unless Multibeam)	
	4 - Conical	(Unless Multibeam)	
	5 - Helical	(Unless Multibeam)	
	6 - Steady		
	7 - Azimuth OMNI		
	8 - Associated Scan		
3)	Azimuth Scan Master Emitter	(Associated)	1 - 1023
4)	Azimuth Beamwidth or Special Pattern (DEG)	(Unless Azimuth OMNI)	-5 - -1, 360/1024-180
5)	Azimuth Scan Period (SEC)	(Sector, Conical, Circular)	0 - 60
		(Raster, Helical)	
6)	Scan Depth (dBM)	(Conical)	4 - 19
7)	Azimuth Track Platform	(Sector, Conical, Steady) (Associated)	-2 - +255
8)	Azimuth Start Angle (DEG)	(Sector, Raster, Conical) Steady, Associated and No Track	-360 - +360
9)	Azimuth PRI/Scan Period Sync	(Sector, Conical)	
10)	Azimuth UNI/BI Directional	(Sector, Conical, Associated)	
11)	Azimuth Scan Return Blank	(Sector, Conical, Associated and BI)	
12)	Azimuth Sector Width (DEG)	(Sector, Raster, Conical)	0 - 360
13)	Number of Levels/Bars	(Raster, Helical)	2 - 100
14)	Elevation Scan Period Sync	(Sector)	

15)	Elevation Scan Type 1 - Sector 2 - Steady 3 - Elevation OMNI 4 - Associated Scan	(Unless Conical, Raster, Helical, Multibeam)	
16)	Elevation Scan Master Emitter	(Associated)	1 - 1023
17)	Elevation Beamwidth or Special	(Unless Elevation OMNI	-5 - -1, 360/1024 -
180	Pattern (DEG)	or Conical)	
18)	Elevation Scan Period (DEG)	(Sector, Conical)	0 - 60
19)	Elevation Track Platform	(Sector, Steady, Associated)	-2 - +255
20)	Elevation Start Angle (DEG)	(Sector, Steady, Associated and No Track) (Raster, Helical, Multibeam)	-90 - +90
20.NN)	Additional Elevation Start Angles (DEG)	(Multibeam)	-90 - +90
21)	Elevation PRI/Scan Period Sync	(Sector)	
22)	Elevation UNI/BI Directional	(Sector, Associated)	
23)	Elevation Scan Return Blank	(Sector, Associated and BI	
24)	Elevation Sector Width (DEG)	(Sector, Raster, Helical)	.352 - 180
25)	Azimuth Scan Period Sync	(Sector)	

A.10 TABLE X - SYSTEM CONTROL PAGE PARAMETERS

1)	Scan Display Status 0 - Disabled 1 - Scan Sync Enabled 2 - PRI Sync Enabled 3 - Both		
2)	Sensitivity Override (dBM)		-255 - 0
3)	Priority Flag		
4)	Missing Pulse factor (%)		0 - 100
5)	Bearing Jitter (DEG)		0 - 45
6)	Elevation Jitter (DEG)		0 - 45
7)	Direct Assign Synthesizer Channel Number	(Required for CW)	
8)	Dedicated Synthesizer Channel (0/1)	(Direct Assign)	
9)	FM Enable		
10)	1 for SPS Video, 2 for TTWS Video, 3 for Both	(Unless Associated Emitter Selected)	
11)	SPS Video Pulse Offset (NSEC)	(SPS Video Only) (Default -100 NSEC)	-950 - 1950
12)	SPS Video Pulse Width (USEC)	(SPS Video Only) (Default -100 NSEC)	.1 - 102.3
13)	TTWS Video Pulse Offset (NSEC)	(TTWS Video Only) (Default -100 NSEC)	-950 - +950
14)	TTWS Video Pulse Width (USEC)	(TTWS Video Only) (Default PW+200 NSEC)	.1 - 102.3
15)	User Flag 1	(Unless SPS Video)	
16)	User Flag 2	(Unless TTWS Video)	
17)	User Flag 3		

A.11 TABLE XI - EDIT PLATFORM PARAMETERS

0)	Event Time		
	Event Type		
	0 - New		
	1 - Reposition		
	2 - Velocity Change		
	3 - Turn		
1)	Platform Number	(All)	0 - 55
2)	East-west position	(New, Reposition)	-2000 - +2000 KM
3)	North-south position	(New, Reposition)	-2000 - +2000 KM
4)	Altitude	(New, Reposition)	0 - +1000 KM
5)	Heading	(All)	-360 - +360 DEG
6)	Velocity	(New, Velocity Change, Turn)	0 - +5000 KM/HR
7)	Climb Rate	(New, Velocity Change)	-511 - +511 M/SEC
8)	Turn Angle	(Turn)	-360 - +360 DEG
9)	Turn Time	-(Turn)	0 - 511,07 MM,SE
10)	Platform ID	(New)	

APPENDIX B

ATEWES MENUS

B.1 Executive Menu

Code Command

1 Emitter Library Maintenance 2 Scenario Development 3 Scenario Listing 4 Pulse Density Analysis. 5 Preprocessing for Correlation 6 Correlation 7 Correlation Analysis 8 Simulation Recording Listing 9 File Interchange 10 Realtime Simulation 11 System Maintenance 12 System Utilities 99 Exit

B.2 Library Maintenance Commands

Code	Command
1	List Library Emitter(s)
3	Delete Library Emitter(s)
4	Update Library Emitter(s)
5	List EWIR ELINT System(s)
6	List EWIR Tape Directory
7	List Library Emitter Directory
99	Exit

B.3 Scenario Editor Commands

Code	Command	Code	Command
0	List Next Event	1	Delete Current Event
2	Insert New Event	3	Search for Emitter Reference
4	Search for Platform Reference	5	Search for Time Reference
6	Search for Event Reference	7	Rewind the Scenario
8	Save Emitter Characteristics	9	Recall Emitter Characteristics
10	Edit Current Event	11	Global Deletes
12	Duplicate Current Event	13	Global Edit
14	Edit Display Parameters	15	Reset Situation Display
16	Specify Platform of Interest	17	Enter Graphic Input Mode
18	Merge Scenario	99	Exit

B.4 Realtime Commands

Code	Command	Code	Command
1	Start Scenario	2	Stop Scenario
3	Set Scenario Speed	4	Radiation Off
5	Radiation On	6	Advance the Scenario
7	Backup the Scenario	8	Initiate Automatic Repeat Loop
9	Set Pulse Counter Periodicity	10	Spectrum Analyzer Control
11	Set DOA Test Point	12	Display Latest Pulse Count
13	Disable Recording of All Events	14	Display System Status
15	Edit Filter Limits for Status	16	Edit Situation Display Parameters
17	Reset Situation Display	18	Enter Scenario Event
19	Display Emitter Mapping	20	Display Emitter Parameters
21	Display Platform Parameters	22	Display Active Emitter List
23	Display Active Platform List	99	End Simulation Run

B.5 Spectrum Analyzer Control Commands

Code	Command	Code	Command
1	Reslotuion Bandwith	2	Sweep Time
3	Input Attenuation	4	Center Frequency
5	Frequency Span	6	Start Frequency
7	Stop Frequency	8	Reference Level
9	CF Step Size	10	Display Line Enter
11	Display Line Off	12	Step Up
13	Step Down	14	Clear-Write A
15	Clear-Write B	16	Max Hold A
17	Max Hold B	18	View A
19	View B	20	Blank A
21	Blank B	22	Trigger Line
23	Trigger External	24	Trigger Video
25	Trigger Free Run	26	Full Span 0-2.5
27	Full Span 2-22	28	Save N
29	Recall N	30	Reset Analyzer
31	Manual Command	32	Tune to Emitter
33	Auto Scan Active Emitters	99	Return to Main Menu

B.6 DGU Test Menu

Code	Command	Code	Command
0.0	Run All Tests	1.0	Parameter Storage
2.0	Basic Processing	2.1	Basic PRI Subtest
2.2	Density Subtest	3.0	Pulse Analysis
4.0	Emitter Link	4.1	Sequence Link
4.2	Link Code Jitter	4.3	Sync Emitter Link
4.4	Repeat Count Link	4.5	Pattern Switch Link
5.0	Data Paths	6.0	PRI Generation
6.1	PRI Modulation	6.2	PRI Jitter
7.0	RF Generation	7.1	RF Modulation
7.2	Frequency Agility	8.0	Azimuth Scan
8.1	Azimuth Scan Rate	8.2	Azimuth Sector Width
8.3	Azimuth Beamwidth	8.4	Azimuth Antenna Pattern
9.0	Elevation Scan	9.1	Elevation Scan Rate
9.2	Elevation Sector Width	9.3	Elevation Beamwidth
9.4	Elevation Antenna Pattern	10.0	Receiver Scan
16.0	Enable Trace	17.0	Disable Trace
99.0	Exit		

B.7 RF Test Menu

Code	Command	Code	Command
0.0	Run All Tests	11.0	RF Management
11.0	Data Paths	11.2	Channel Allocation
12.0	Freq. Synthesizer	12.1	Freq. Accuracy
12.2	Output Power	13.0	Pulse Modulation
14.0	Chirp	15.0	Freq. Distribution
16.0	Enable Trace	17.0	Disable Trace
99.0	Exit		

B.8 System Utilities

Code	Command
1	Make Backup
2	Recover File From Backup Tape
3	Delete File
4	Rename File
5	Purge Files
6	Dismount DX Disc
7	Initialize DX Disc
8	Mount DX Disc
9	Edit File

APPENDIX C

DEFAULT INITIALIZATION FILE

LINE	DESCRIPTION
1	EW System Platform Number
2	Initial DX File Size
3	IRIG-B Time Flag
4	Power Boost File Name
5	Max Available Power File name
6	Receiver Gain File Name
7	Receiver Sensitivity File Name
8	Azimuth Receiver Pattern File Name
9	Elevation Receiver Pattern File Name
10	Frequency Disable File Name
11	System Mode
13-22	RF Channel Pooling Flags

Line 2 - Initial DX File Size is used to allocate the initial size of the DX file on the DEC PDP11 Simulator.

Line 3 - The IRIG-B Flag determines whether the internal tick count (Flag=0) or the external IRIB-B time (Flag=1) will be recorded with each DX event.

Line 13 - System Mode is defined as follows:

0	Digital Fixed Antenna
1	Digital Rotating Antenna
2	RF Fixed Antenna
3	RF Rotating Antenna

Lines 13-22 - The RF Channel Pooling Flags allow the operator to disable

pool'.n for any one of the 10 RF channels by entering a non-zero value for the appropriate flag.

APPENDIX D

SYSTEM UNDER TEST FILES

D.1 Maximum Power, Receiver Gain, Sensitivity Files

The Maximum Power, Receiver Gain and Sensitivity files all have similar formats, each consisting of a total of one hundred and fifty two records. Each record contains a single floating point value stored in ASCII format. The files are created using the text editing utility supplied as part of RSX-11M. An optional comment may be placed on each line, by placing a comma in the first column after the value field, followed by any ASCII text string. The value field is of no fixed length, and is terminated by either the comma if a comment is included, or by the carriage return if no comment is present. Leading and trailing spaces are read as zeroes, so no unnecessary spaces should be left before the return or comma.

Each successive record corresponds to the next frequency value, beginning at 384 Mhz, and incrementing by 128 Mhz per record. Frequencies associated with each record, therefore, are always increasing as the file is read. As an example, the first 16 records of a fictitious file are included.

-3.52, 384 Mhz, first frequency
-3.52, 512 Mhz, second frequency
-3.52, 640 Mhz, third freqency
-3.52, 768 Mhz, fourth freqency
-3.52, 896 Mhz, fifth freqency
-3.52, 1024 Mhz, sixth freqency
-3.52, 1152 Mhz, seventh frequency
-3.52, 1280 Mhz, eighth frequency
-3.52, 1408 Mhz, nineth frequency
-3.52, 1536 Mhz, tenth frequency
-3.52, 1664 Mhz, eleventh frequency
-3.52, 1792 Mhz, twelfth frequency
-3.52, 1920 Mhz, thirteenth frequency
-3.52, 2048 Mhz, fourteenth frequency
-3.52, 2176 Mhz, fifteenth frequency

-3.52, 2304 Mhz, sixteenth frequency

The Maximum Power file contains the maximum power output of the simulator available for each frequency in dBm. The Receiver Gain file contains the receiving antenna gain for each frequency in dB. The Sensitivity file contains receiver sensitivities in dB which are subtracted from the Maximum Power file entries to determine default power levels below which the simulator will not attempt to generate a signal.

D.2 Receiver Pattern Files

The Receiver Pattern Files specify the receiver antenna pattern code as a function of freqency. The file is created and maintained by the system text editor. Each record contains a floating point frequency, a comma and the corresponding antenna pattern code. The code will be valid for all freqencies from the frequency on that line to the freqency on the next line. The frequency is specified in gigahertz, and must begin with .5 GHZ. The last pattern code is assumed to be valid up to 18 GHZ. Identical format files are created for both azimuth and elevation pattern codes. The example below illustrates construction of a sample file.

Frequency Range	Desired Pattern Code
.5 - 1	1
1.-4.5	2
4.5-6.5	3
6.5-9.0	4
9.0-18.	5

ANTENNA PATTERN FILE

RECORD	CONTENT
1	.5,1
2	1.,2
3	4.5,3
4	6.5,4
5	9.0,5

APPENDIX E

FAULT TESTING CONTROL FILES

E.1 DGU & RF Management (Digital Tests) Control Files

Tests 2-11 use ASCII files for DGU programming control. The files allow for easy modification/addition of many test parameters. The files are created and maintained using the system text editor. The files can be of any length.

Basically, the data files consist of optional comments and DGU commands. In addition, there is the facility to pass back parameters to the test routine that it would be expecting. The file interpreter can be placed into either of two modes under control of the data file. The modes are called the linear mode, and the looping mode. Each line in the linear mode is interpreted as a single DGU command with associated data. In the looping mode, a DGU command can be sent to many emitters, and have an increment asscciated with the data.

In the linear mode, commands are in the following form:

```
Bmm,Bnn          (optional comment
```

where B is the character "D" or "O" denoting decimal or octal for the number following. The command code is represented as mm, and the command data as nn. All DGU commands are legal. Special commands are used to communicate to the interpreter and result in nothing sent to the DGU. These commands are:

```
D90,D0           (logical end of file
D91,Dxx          (breakpoint with optional data xx
D98,D0           (change mode linear -> looping or looping -> linear
```

When going from linear mode to looping mode three parameters must be provided; emitter start number, emitter end number, emitter increment. The following code results in going into looping mode for emitters 0 through 4.

```
D98,D0          (Go into looping mode
D0              (Start emitter number is 0
D4              (End emitter number is 4
D1              (Emitter increment is 1
```

When in looping mode, commands occur in line pairs. The first line is the DGU command of the same form as in linear mode. The second line is a floating point number representing the value to increment the data by for each emitter. The following code causes each emitter in the loop to be sequence linked to itself.

```
D98,D0          (Go into looping mode
D0              (Start with emitter 0
D1023           (End with emitter 1023
D1              (Emitter increment is 1
D1,D0           (Sequence link emitter to itself
1.0             (Same for each emitter
D98,D0          (Exit looping mode
```

The following table summarizes the default files that use this format and its use in the program.

Test	File Name	Contents
2.1	BPRI.DAT	Basic PRI DGU Commands
2.2	DENSTST.DAT	Density Test DGU Commands
3.0	THRTST.DAT	Threshold Test DGU Commands
4.1	SEQLNK.DAT	Sequence Link DGU Commands
4.2	SEQJIT.DAT	Sequence Link Jitter DGU Commands
4.3	SYNLNK.DAT	Sync Link DGU Commands
4.4	RPTLNK.DAT	Repeat Link DGU Commands
4.5	PATLNK.DAT	Pattern Link DGU Commands
6.1	PRIMOD.DAT	PRI Modulation DGU Commands
6.2	PRIJIT.DAT	PRI Jitter DGU Commands
7.1	RFMOD.DAT	RF Modulation DGU Commands
7.2	RFJIT.DAT	RF Agility DGU Commands
8.1	AZ1TST.DAT	Azimuth Scan Rate DGU Commands

8.2	AZ2TST.DAT	Azimuth Sector Width DGU Commands
8.3	AZ3TST.DAT	Azimuth Beamwidth DGU Commands
8.4	AZ4TST.DAT	Azimuth Antenna Pattern DGU Commands
9.1	EL1TST.DAT	Elevation Scan Rate DGU Commands
9.2	EL2TST.DAT	Elevation Sector Width DGU Commands
9.3	EL3TST.DAT	Elevation Beamwidth DGU Commands
9.4	EL4TST.DAT	Elevation Antenna Pattern DGU Commands
	DGURDY.DAT	DGU Readiness Check DGU Commands
Many	INI2DGU.DAT	DGU Initialization Commands

E.2 RF Test Point Files

All RF tests (12-15) use ASCII data files to specify the test points. Each file is variable length, consisting of one test point per line. The files are created and maintained using the system text editor. Each test point entry consists of a floating point value in ASCII format, followed by an optional comma and constant. The following table summarizes the default file names and maximum file sizes for each of the RF tests.

Test	File Name	Maximum Length	Contents
12.1	T121.FRQ	1000	Frequency Values
12.2	T122.FRQ	1000	Frequency Values
12.2	T122.ATN	100	Attenuation Values
13	T13.FRQ	100	Frequency Values
14	T14.FRQ	100	Frequency Values
14	T14.CHP	100	Chirp Rates
15	T15.FRQ	100	Frequency Values

APPENDIX F

FREQUENCY SYNTHESIZER BANDS

The frequency synthesizer provides four banded outputs across the total output range. During fault testing, the operator may select which of these frequency ranges is to be exercised. The four output bande are defined as follows.

Band	Frequency Range
1	500 - 2047.875 Mhz
2	2048 - 8191.875 Mhz
3	8192 - 13311.875 Mhz
4	13312 - 19455,875 Mhz

APPENDIX G

ATEWES HELP FILE NAMES

Program	Help File Name
Executive Menu	TMENU.HLP
Emitter Library Maintenance	ALMES.HLP
Scenario Development	ALMES.HLP
Scenario Listing	LISCN.HLP
Pulse Density Analysis	ENVR.HLP
File Interchange	TMENU.HLP
Realtime Simulation	ALMES.HLP
Fault Testing	FLTST.HLP

APPENDIX H

EMITTER PARAMETER RESTRICTIONS

H.1 ** PRI AND FREQUENCY TYPE INCOMPATIBLE

The following frequency/pri combinations are never acceptable.

Frequency Periodic, Discrete PRI Jitter
Frequency Switching, PRI Switching
Frequency Switching, Discrete PRI Jitter
Discrete Frequency Agility, Discrete PRI Jitter
Multibeam Frequency, PRI Sequence
Multibeam Frequency, PRI Switching
Multibeam Frequency, Discrete PRI Jitter
Associated Frequency, Discrete PRI Jitter

The following frequency/PRI combinations are acceptable only when the number of frequency segments equal the number of PRI segments.

Frequency Sequence, PRI Sequence
Frequency Sequence, PRI Switching
Frequency Switching, PRI Sequence

The following frequency/PRI combinations are acceptable only when the number of frequency segments equal the number of PRI segments or a number of segments is one.

Frequency Sequence, PRI Periodic
Frequency Periodic, PRI Sequence

The following frequency/PRI combinations are acceptable only if one type is a single segment.

Frequency Periodic, PRI Periodic

Frequency Periodic, PRI Switching
Frequency Switching, PRI Periodic
Discrete Frequency Agility, PRI Periodic
Multibeam Frequency, PRI Periodic

The following frequency/PRI combinations are acceptable only when the number of frequency segments equal the number of PRI segments and the discrete is a known set.

Frequency Sequence, Discrete PRI Jitter
Discrete Frequency Agility, PRI Sequence

All remaining combinations are acceptable.

** EMITTER ASSOCIATED TO ITSELF

An emitter cannot have its own emitter number as an associated emitter number.

** FIRST PRI <2 USEC

A non-dependent emitter's first PRI must be greater than or equal to 2 microseconds.

** VIDEO INCOMPATIBLE WITH FREQUENCY/PRI TYPE

An SPS or TTWS emitter must be a single segment emitter and cannot be a continuous wave emitter.

** SEGMENT IS A LONG PRI AND FREQUENCY SWITCHING

A frequency switching emitter cannot have a segment with a PRI >4095 microsecond associated with it.

** SEGMENT IS A LONG PRI WITH ASSOCIATED EMITTER

A segment with a PRI greater than 4095 microseconds cannot have an associated

emitter number.

** PULSE WIDTH >10 USEC, WITH CHIRP

An emitter with a non-zero chirp limit cannot have any segment with a pulse width greater than 10 micro seconds.

** PULSE WIDTH >PRI

No emitter segment may have a pulse width greater than its PRI.

** CW EMITTER NOT ASSIGNED A CHANNEL

A continuous wave emitter must be assigned to a channel of the frequency synthesizer.

** MULTIBEAM CANNOT HAVE ASSOCIATED EMITTERS

A multibeam frequency emitter must have a zero for associated emitter number.

** SPS OR TTWS CANNOT HAVE ASSOCIATED EMITTERS

ASPS or TTWS video emitter must have a zero for associated emitter number.

** PRI - JITTER <2 USEC

A segment with a base PRI greater than or equal to 2 microseconds cannot be jittered to a PRI less than 2 microseconds.

** EMITTER CANNOT HAS LONG AND SHORT PRI

An emitter cannot have a segment with a PRI greater than 4095 microseconds and a segment with a PRI of less than 2 microseconds.

** LONG PRI ON ILLEGAL EMITTER TYPE

There are several types of emitters which cannot have a PRI greater than 4095 microseconds. Frequency Switching, Discrete Agility and Multibeam cannot. Frequency/PRI periodics must be 1 segment. For a Frequency Sequence a Simple PRI, PRI Periodic, PRI Switching and a DISCRETE Jitter are illegal. Finally a Discrete Jitter unknown set cannot have a PRI greater than 4095 microseconds.

** LONG PRI ON DEPENDENT SIGNAL

A dependent signal emitter cannot have a PRI greater than 4095 microseconds.

** ASSOCIATED EMITTER LIST, SHORT PRI

An emitter with a PRI less than 2 microseconds cannot have an associated emitter list.

** FREQUENCY - AGILITY <500 MHZ

Frequency agility cannot combine with the base to produce a frequency of less than 500 megahertz.

** PRI TYPE, DEPENDENT SIGNAL INCOMPATIBLE

The PRI types which are incompatible are

- Periodic, more than one segment
- PRI Switching
- Discrete PRI Jitter

** FREQUENCY TYPE, DEPENDENT SIGNAL INCOMPATIBLE

The frequency types which are incompatible are

- Periodic, more than one segment
- Frequency Switching
- Discrete frequency agility
- Multibeam frequency

** FREQUENCY + AGILITY >19455 MHZ

Frequency agility cannot combine with the base to produce a frequency of greater than 19455 megahertz.